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THE ROLE OF THE URETER

IN DISEASES OF THE GENITOURINARY TRACT

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HISTORY

NEITHER anatomical nor philosophical consideration of the ureter has a place in the history of ancient medicine. Hippocrates doubtless saw more than one case of kink, stricture and impacted stone, but unfortunately his descriptions are not detailed enough to permit us to interpret them correctly today, and as the prejudices of his time would not permit autopsies, he was never able to find out after death that the trouble had resided in this apparently innocuous little duct.

It was not until the Middle Ages had almost come to an end that the ureters received any attention from medical writers. Apparently the first anatomical description was published in 1585 by Albertus in his "Tres Orationes Norimbergae." In Laurentius Bellini's little volume, "De Structura Renum," which left the printer's hands two hundred and sixty-three years ago, I have found a very neat drawing showing a bisection of the kidney through the pelvis and ureters, with the halves of the right and left ureters duly labelled and represented. In the text we find the author expressing wonder that his predecessor Highmore, whose name has come down to us as an appellation of the maxillary sinus, had failed to note the fact that humans have more than one ureter, inasmuch as he had credited animals with possessing two. Of the anatomy and physiology of these ducts Bellini has little to say, merely noting that when the renal secretion had been elaborated according to his understanding of this process, it was conveyed by the ureters to the bladder.

A few years later we find Johannis Riolani criticizing Casper Bauhinus because this worthy had stated in his "Theatre Anatomicum": "It is not generally known that the ureters are sometimes divided below the kidneys into three, four or even five different branches." Riolani would have none of this; it was plainly contrary to nature as well as common sense. It was not until long afterward that duplication of the ureters was acknowledged as a possibility, and not until the immediate present has it been realized to be a relatively common finding.

In the eighteenth century we find several anatomists giving attention to the question as to whether or not there are valves at the vesical ends of the ureters. Dilthey in 1723 had something to say about this, and van Beelhoven de Wind made the anatomy of the ureters the subject of his dissertation delivered in 1734. Other studies were made by Gontard in 1757 and Guigneux in 1760, while Pohl published

some observations at Leipzig in 1772. Anatomy thus received considerable attention before the nineteenth century began, but none concerned themselves with the physiology of the ureters until the year 1812, when Charles Bell called the attention of the members of the Medical and Chirurgical Society of London to "a set of muscles attached to the orifices of the ureters and seated in the bladder, which seem not to have been observed by former anatomists." It is a bit ironic that these muscles still bear Bell's name, although the function he attributed to them has since been proved non-existent.

Soon after Bell announced his discovery, French surgeons, who were even then specializing in urology, began making more detailed studies of this particular section of the genitourinary tract, so that by the middle of the century a fair body of knowledge concerning the anatomy, physiology and pathology of the ureters had been accumulated. The introduction of surgical anesthesia and the discoveries of Pasteur and Lord Lister enabled surgeons to reach the region of the ureters and view them in the living subject, so that not a few points hitherto shrouded in the deepest mystery were explained and made to serve in the onward progress of urologic technique. This knowledge has been infinitely extended by the introduction of pyelography, so that at present the haze of mystery which had heretofore surrounded the ureter and its functions has in a great measure been dispelled.

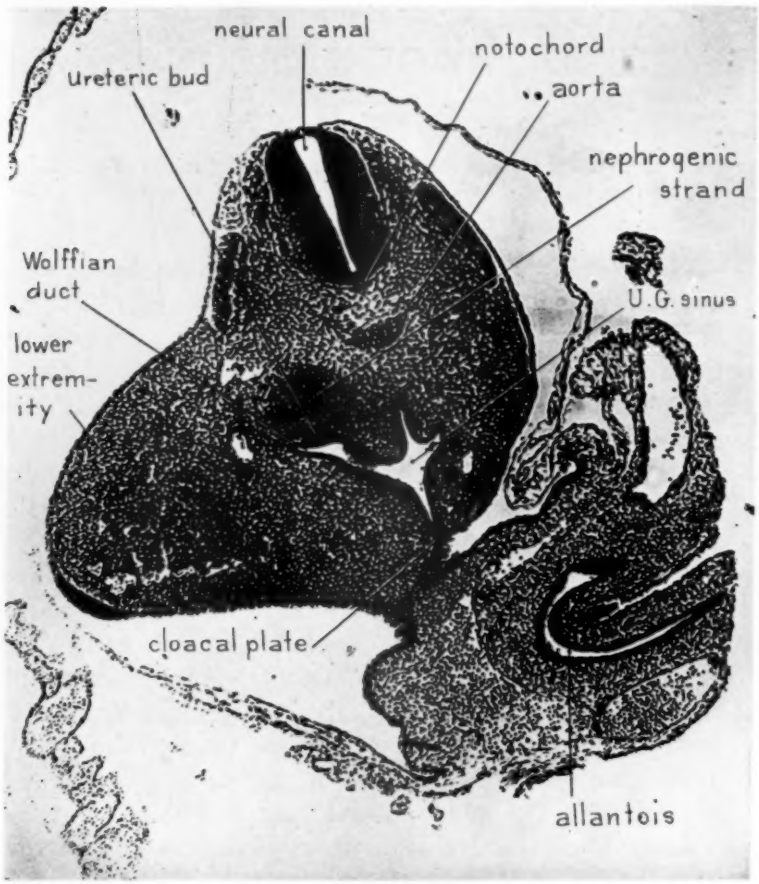

Fig. 1. Cat embryo, 7 mm., showing ureteric bud. Courtesy, Dr. Elwyn, Department of Anatomy, Columbia University.

EMBRYOLOGY

In all the higher vertebrates embryological development produces three excretory organs which appear in succession during

intrauterine life. These are the *pronephros*, *mesonephros* and *metanephros*, which develop in the order named, the first and second being temporary structures while the third eventually takes its place as the kidney of complete development. All three of these organs arise from a series of mesodermal cell-masses, the nephrotomes or primitive segment stalks which extend longitudinally on either side of the neural canal. As these primitive segment stalks are the components from which the nephrogenic cord is derived, all three of the structures just mentioned may be regarded as of mesodermal origin.

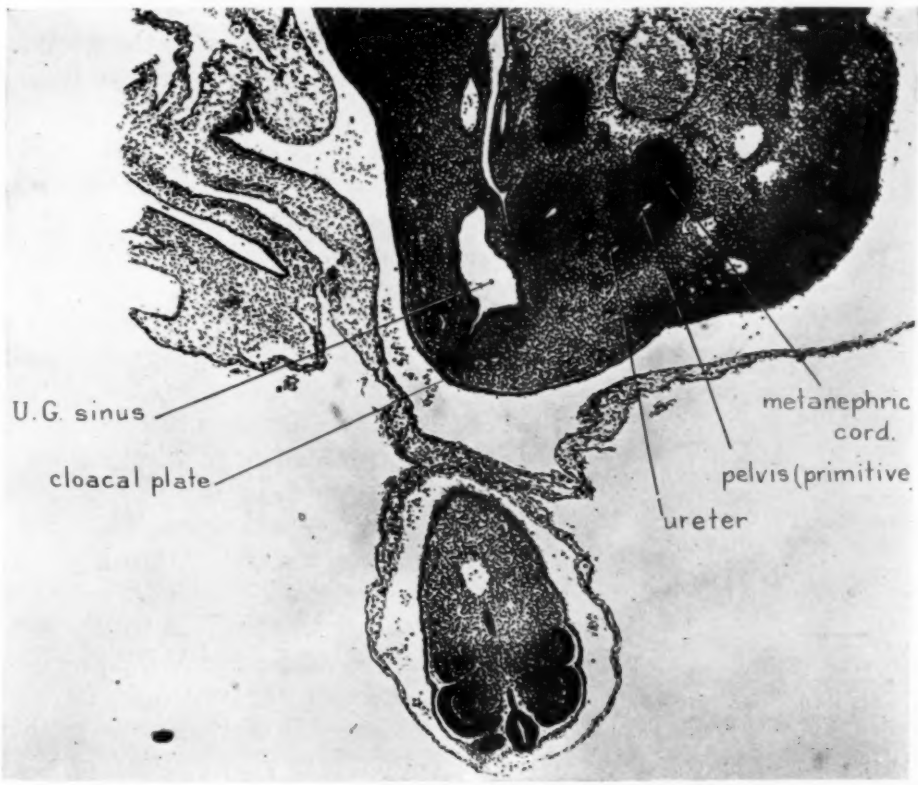

Fig. 2. Cat embryo, 8.5 mm., showing ureteric bud and urogenital sinus. Courtesy, Dr. Elwyn, Department of Anatomy, Columbia University.

The pronephros is formed very early in fetal life from the cranial portion of the nephrogenic cord. Thereafter the cord divides into a mesonephrogenic and a metanephrogenic portion, from the first of which the Wolffian body is derived; the second is destined to form eventually the secreting portion of the permanent kidney. The persistence of the duct of the pronephros after its early disappearance is the only claim which this rudimentary organ has upon embryological interest. As the Wolffian duct this later becomes the excretory duct of the mesonephros or, as it is more commonly termed, the Wolffian body. This organ is at the height of its development about the fourth or fifth week of fetal life, and apparently undergoes atrophy from the eighth week onward. The duct, however, persists when the second organ has disappeared and in the final state of fetal development appears as the vas deferens in the male and the rudimentary Gaertner's duct in the female.

About the time the embryo has reached a length of 5 mm. the metanephros or permanent kidney makes its appearance as a budding or evagination from the lower end of the Wolffian duct close to its point of opening into the cloaca. From this bud there will be formed eventually the

calyces and collecting tubules of the permanent kidney as well as the renal pelvis and its ureter—that is, the entire efferent apparatus. The secreting portion of the kidney has its origin in a mass of mesoder-

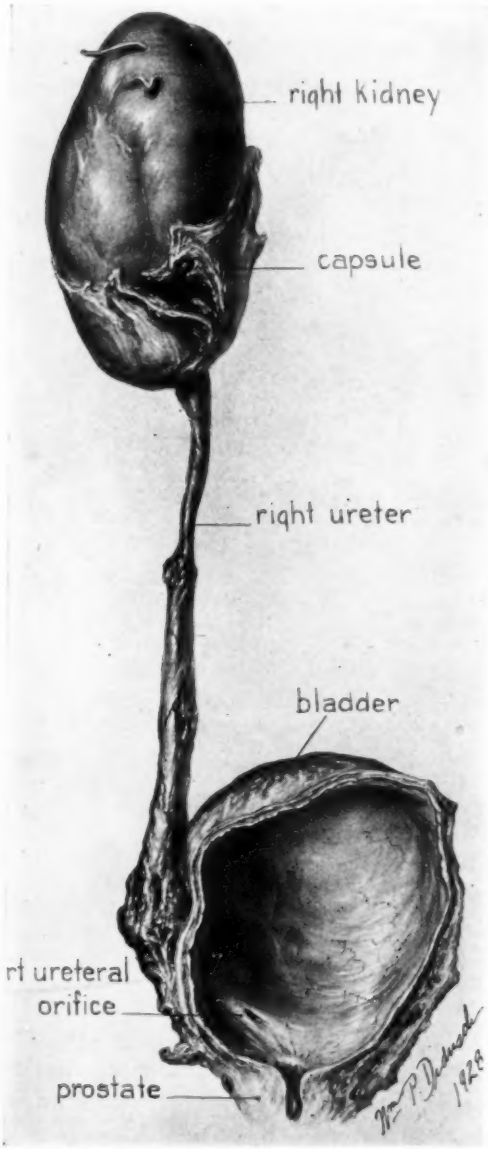

Fig. 3. Single kidney and ureter. One of the many reasons for a complete urological examination before the removal of a kidney. Courtesy, Dr. Christeller, Virchow Krankenhaus, Berlin.

mal cells arising from the cauderl portion of the nephrogenic cord. This mass of cells surrounds the tip of the ureter very soon after its evagination, even before the bud has had time to grow a distance equivalent to the diameter of the Wolffian duct, so that they come to form a distinct "cap" covering the bulbous tip of the ureteral bud (Fig. 1). This bud grows first toward the vertebral column, then turns to grow upward toward the cranium. Its cap accompanies it in the ascent so that when the embryo is no more than 6.6 mm. in length the ureteral tip has become bulbous and the primitive pelvis is thus differentiated from the more slender stalk that now begins to resemble the organ it is destined to become—the ureter.

As the kidney continues its independent development, changes are taking place in the lower end of this stalk. By a process of dilatation the lower end of the Wolffian duct comes to form a portion of what will in future be the bladder wall. This makes it necessary for the ureter to acquire an orifice separate and distinct from the Wolffian duct. The segment of the common cloaca previously shared by the Wolffian duct and future ureter disappears, being incorporated into the dilatation of the cloaca which is later to become the bladder and urogenital sinus. Thus the two ducts acquire separate openings, the ureter passing beside the Wolffian duct and entering what will in future be the trigone vesicae, while the Wolffian duct, destined to become the vas deferens, finds its termination further down so that it comes to empty into that portion of the tract destined to become the prostatic urethra.

When the embryo has attained a length of approximately 8 mm., the bulbous tip with which the ureter has been equipped splits in two, thus indicating the future division into calyces. This step in the development of the ureter is of especial interest in connection with certain relatively frequent anomalies. An incomplete double ureter is generally supposed to be due to a premature or exaggerated bifurcation of this tip, the split extending down the stalk. If the bud splits before the primitive renal pelvis has had a chance to form, the two ureters originating from the bifurcation of the stalk will ascend parallel to each other (Fig. 2). Felix, whose conception this is, designates such anomalous

forms as this last as "cleft ureter," reserving the designation of "double ureter" for those showing complete separation and separate entrances for each duct through the bladder wall.

normal which would otherwise have passed completely unrecognized. Certain malformations, however, were recognized and sought for long before Roentgen made his revolutionary discovery, and the develop-

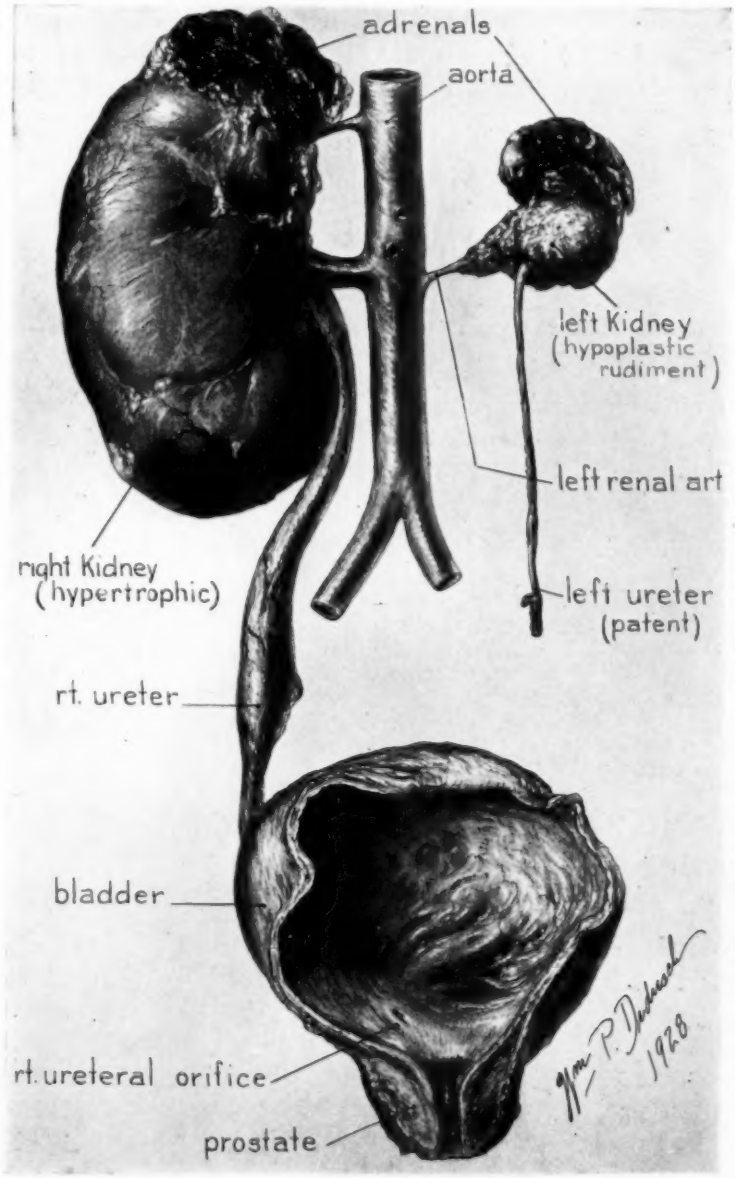

Fig. 4. Single kidney with a hypoplastic left kidney with patent ureter. Courtesy, Dr. Christeller, Virchow Krankenhaus, Berlin.

ANOMALIES

The frequency of anomalies of the ureters is becoming more widely recognized every day, for the introduction of roentgenographic diagnosis has brought to light great numbers of variations from the

ment of cystoscopy with ureteral catheterization did much to make urologists more or less familiar with the surprising forms which the renal ducts may at certain times assume. In 1910, J. and P. Delmas, French surgeons, published the most complete

survey of ureteral anomalies that, so far as I am aware, had ever been made in any language. Many of the cases which they cite appear to be unique, and so detailed is their consideration of these curiosities that no one not thoroughly familiar with the language would ever have the patience to read the entire article. The interest of the present day clinician lies not so much in

Fig. 5. Non-patent ureters. This child lived sixteen days, urinating into the bladder wall. Courtesy, Dr. Johnson, Department of Pathology, Columbia University.

the rare and curious cases as in those he is more than likely to encounter in his own daily round. For this reason the consideration of ureteral anomalies recently appearing under the names of Eisendrath and Papin has much to recommend it. The classification which these authors have made covers the entire subject clearly and succinctly:

1. Anomalies in number.

2. Anomalies of calibre and form: (a) congenital strictures, (b) congenital dilatation, (c) valves, (d) spi-al twists and kinks.

3. Anomalies of origin or termination: (a) abnormal modes of origin, (b) ureterocele or cystic dilatation of lower end, (c) blind-ending ureters (Fig. 4), (d) ectopic termination of the lower end.

4. Diverticula of the ureter.

Anomalies in Number. Variations in the number of ureters is by far the most common and, therefore, the most important anomaly of these organs with which we are called upon to deal. Ureteral duplication with double renal pelvis and kidney occurs more frequently than all other renal and ureteral anomalies taken together. Poirer, Bostroem, Huntington, Papin, Motzfeld, Wagner, Robinson and others have variously estimated that it is found in from 1 to 4 per cent of all humans, and certain observers place the percentage even higher. Byron Robinson found six instances of ureteral duplication in one hundred consecutive autopsies. Four cases of double ureter in 165 dissections were reported by Kerr. In a series of 4215 autopsies, 62 cases of one or more congenital defects of the kidneys and ureters were reported on by Lowsley, Kingery and Clarke. Among these bilateral partial reduplication of the ureters occurred three times, and unilateral partial reduplication seven times. There was no complete bilateral doubling, but complete one-sided doubling was found in eight subjects. In two instances there was complete absence of the ureter, and extreme atrophy in eight others. In all there were about 40 cases presenting some ureteral anomaly, or practically 1 per cent of the entire series.

Most investigators explain the occurrence of incomplete double ureter as a result of premature or exaggerated bifurcation of the tip of the ureteral bud, so that the split is not confined to the tip alone, but extends for some distance downward along the ureteral stalk. Some authors explain complete reduplication by the assumption of a separate and secondary

outbudding upon the ureteral stem from the Wolffian duct. As a matter of fact no simple embryologic theory so far put forward can account for all the variations which this anomaly presents in different individual specimens, and we must await further investigation before it will find an entirely satisfactory explanation. (Figs. 3, 4 and 5.)

Anomalities of Caliber and Form. Congenital strictures usually appear at the normal points of narrowing, that is, where the duct emerges from the lower pole of the kidney, about the center of its extent at a point where it comes in contact with the iliac vessels, and at the point of entrance through the wall of the bladder. *Congenital dilatations* are listed by Eisendrath and Papin as total, that is, including the entire ureter and its vesical orifice; subtotal, being of the entire extent of the ureter but not of the vesical orifice, and finally, partial, consisting of a series of spindles. Closely related to this last form of dilatation are the *spiral twists and kinks* which are sometimes undoubtedly of congenital origin, and so may justly be claimed as anomalies. The authors just quoted have found kinks usually in connection with faulty modes of origin of the ureter from the renal pelvis, but they also observed them at a number of different levels, doubtless resulting either from abnormal motility of the kidney or from redundancy, that is, excessive length of the ureter itself.

Anomalies of Origin or Termination. The ureter may take its origin higher up in the renal pelvis than normal, and in excessively rare instances has been found to pass all around the top of the pelvis before descending toward the bladder. Such anomalous origins are very uncommon. *Ureterocele*, cystic dilatation of the vesical end of the ureter, is at times congenital but at others is undoubtedly acquired, and will be mentioned again in considering ureteritis cystica. *Blind endings* are usually found upon anomalous ureters; at times both ends may be blind, so that a supernumerary ureter will have no connection with either kidney or bladder. More often the blind end will be the renal one, while the opening into the bladder will appear normal when viewed through the cystoscope. *Ectopic endings* are, according to Eisendrath, found most often in connection with double kidneys where ureters and renal pelves are duplicated. One of the two ureters (usually the one ending more distally) opens either at some point considerably below the opening of the ureter draining the other half of the kidney or it opens somewhere outside the bladder.

Fig. 6. Megaloureter.

ANATOMY

The ureters serve as trunk-lines of com-

munication and transportation between the kidneys and the bladder. Thus upon their integrity and functional ability both these supposedly more important parts of the urinary system are absolutely dependent. If the transportation system

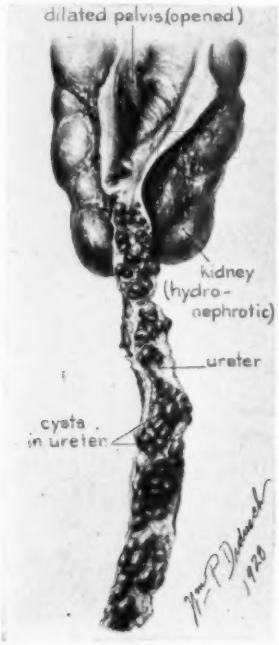

Fig. 7. Ureteritis cystica. Courtesy, Dr. Christeller, Virchow Krankenhaus, Berlin.

is disorganized by some disturbance of ureteral function, such as stricture, impacted stone or new growth, the kidney will be seriously affected or possibly completely destroyed. If the trouble be unilateral the bladder may be able to proceed with its particular functions as though nothing had happened, but in most instances the bladder also shares in the general disorganization which even a very trifling lesion of the ureter is capable of bringing about. The great importance of this seemingly insignificant duct is thus emphasized, and its influence upon every other portion of the genitourinary tract becomes evident.

The ureter is a hollow tube of muscle often compared to a goose quill as to its size and shape. The average length from kidney to bladder is 33 centimeters (12 to 14 inches). It has its origin opposite the lower pole of the kidney, passes downward and inward behind the peritoneum, and eventually reaches the base of the bladder into which it opens by passing obliquely through the vesical wall to a narrow opening called the ureteral meatus.

Constrictions. Throughout its length the ureter presents a diameter of approximately 0.5 cm., except at three or occasionally four definite points where its caliber is greatly reduced. These normal constrictions occur at the point where the duct emerges from the lower pole of the kidney, at a second point near the center of its extent where there is contact with the iliac vessels and finally where the duct enters the bladder wall. The mucous lining of the ureter is continuous with the mucosa of the bladder although it is transitional in character. The ureter is, however, a structure wholly separate from the bladder, and its fibrous and muscle coats are quite distinct from those of the bladder wall.

Histology. The walls of the ureter are made up of three layers, the histological structure of these different strata being important because, together with the nerves which supply this section of the urinary canal, they are directly concerned with the phenomena of urination. The outer fibrous coat carries the large blood-vessels and nerve trunks which are extensively ramified so as to form a plexus which reaches a fuller development on the side next the muscle layer. The middle muscular layer shows subdivision into three distinct strata at about the center of the ureter's extent. At the upper end toward the renal pelvis the muscle fibers form what Satani has termed a "braided membrane" running irregularly in all directions. The isthmus, however, shows a more systematic arrangement, with longitudinal fibers within surrounded by a circular coat. As the bladder is approached the longitudinal fibers predominate while the number of circular fibers becomes less and less, until they finally disappear entirely when the duct has passed through

the bladder wall. The longitudinal fibers, however, can be traced on the outer side as far as the level of the ureterovesical orifice.

Ureterovesical Sphincter. No definite sphincter was found by Satani, acting to shut off the ureter from the bladder cavity. He did, however, observe that "certain structures form a mechanism to prevent a reflux of the bladder content." Two well developed nerve plexuses envelope the middle muscular layer of the ureteral wall, and these probably play an important part in the mechanism thus referred to.

The inner mucous coating of the ureteral wall is supplied with a fine network of nerve fibers, while single nerve cells are to be found in abundance. It is noteworthy that the mucous surface contains no secreting glands. Lymphoid tissue exists in considerable proportion throughout the three strata which compose the wall of the ureter.

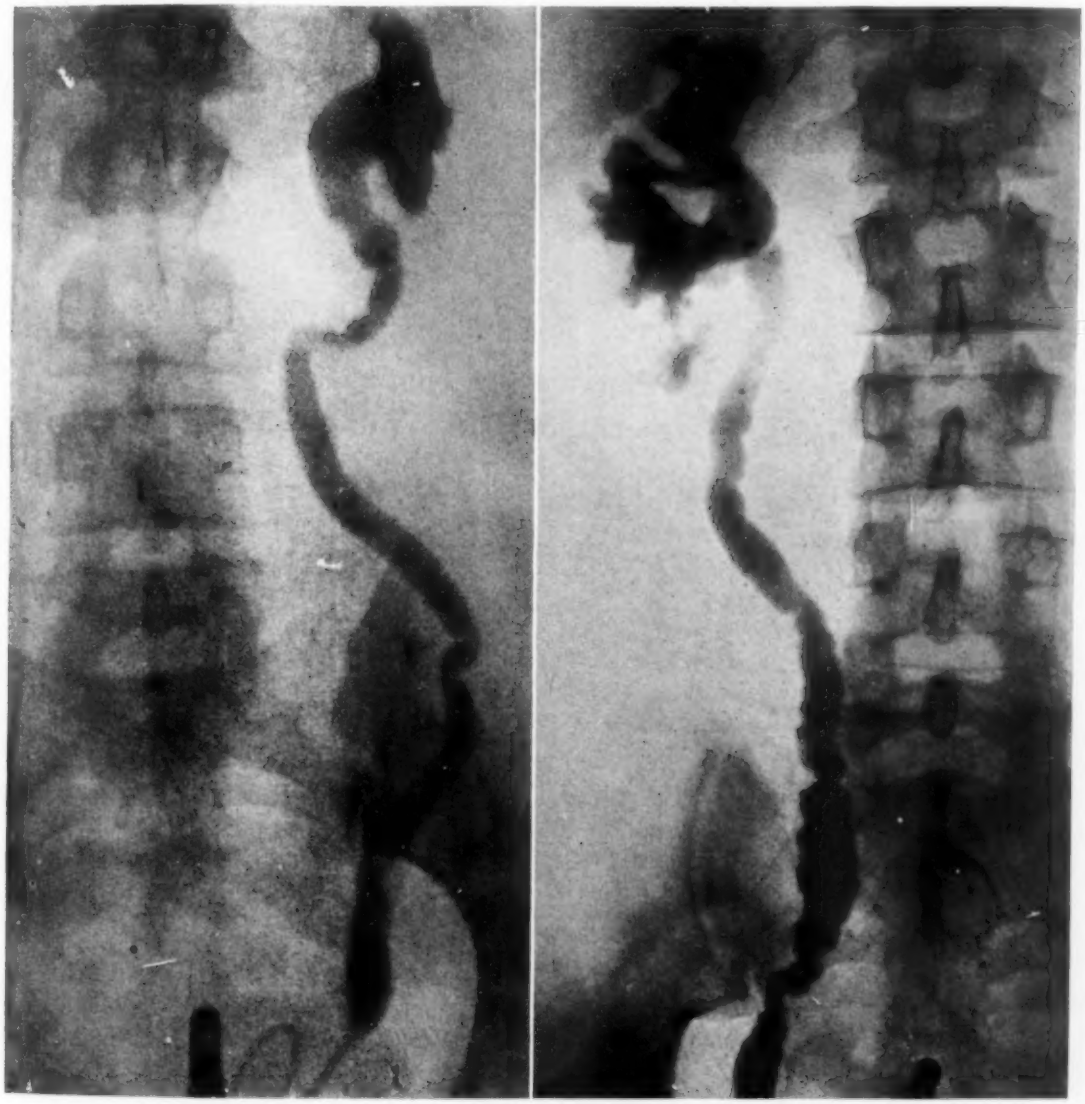

Fig. 8. Fig. 9.

Figs. 8 and 9. Tuberculosis of ureter and kidney, resulting dilatation of ureter and pyonephrosis. Note ragged and irregular contour of ureter and kidney.

Anatomical Relations. The course of the ureter after it leaves the kidney pelvis

is obliquely downward beneath the peritoneum, resting upon the psoas muscle. The right ureter is in close relation to the inferior vena cava with the iliac arteries above, the sigmoid flexure to the left and the ilium to the right. The pelvic portion of both ureters passes in front of the sacroiliac joint in attaining the place of entrance through the bladder wall. The relations of the right ureter are especially important in differential diagnosis, for the most recent investigations into the pathology of the ureter have shown that a number of conditions may arise there which produce symptoms that are frequently attributed to disease of the appendix.

Summarizing the ureter's anatomy and histology, we find as the chief points of interest, (1) it is highly distensible; (2) it has natural points of constriction often accentuated under pathologic conditions and (3) there is a mechanism of some sort at its point of entrance in the bladder wall which acts to prevent regurgitation from the bladder.

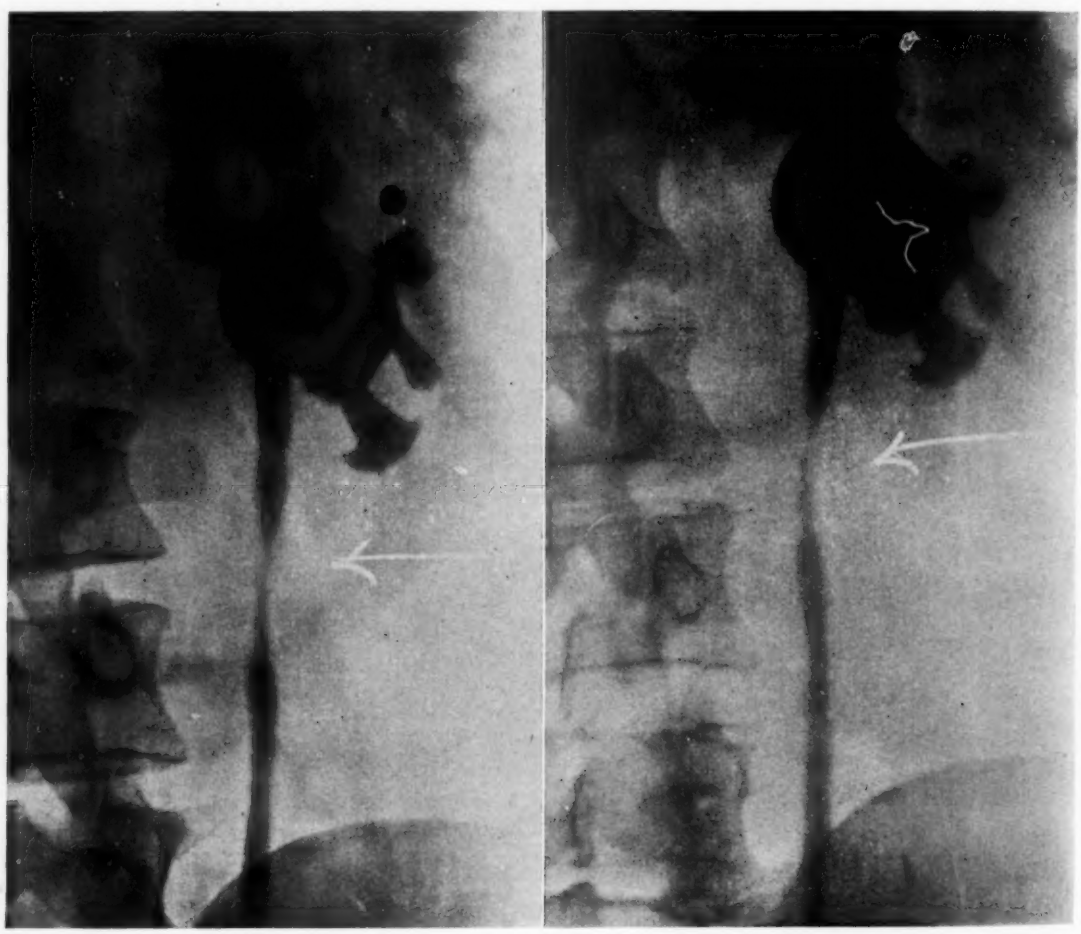

Fig. 10. Fig. 11.

Figs. 10 and 11. Stricture. Exposures at different times showing constancy and similarity of length and size of constriction.

PHYSIOLOGY

Ureteral Peristalsis. The physiology of the ureter has been investigated chiefly in relation to urination. When the ureter has been subjected to special scrutiny the purpose has been to ascertain whether or not it is concerned in the production of urine. Some years ago considerable work was done on ureter pressure. Henderson of the University of Toronto concluded that

what we term ureter pressure depends not upon secretion but upon renal blood pressure. The minimum difference between blood pressure and ureter pressure will vary both with the rate of urinary production and the protein constitution of the plasma. The normal peristaltic movements of the ureters were studied by Lucas of the Rockefeller Institute who found that a suction followed the peristaltic wave, while at the same time a force was exerted on the fluid in front of the wave. In the normal ureter the pressure remains low in the renal pelvis because of an anatomical arrangement which prevents the pelvis from collapsing under negative pressure; that is, there exists a rhythmic movement of the pelvis which brings about a "milking action" upon that portion of the pyramid which projects into it. An increased flow of urine calls forth a more efficient peristalsis and therefore does not produce an increase of pressure. Lucas also noted that in the lower end of the ureter, contractions are smaller but occur more frequently than in the middle section. It is a reasonable supposition that these contractions have some influence in preventing regurgitation.

Fig. 12. Stricture of ureter. Dilatation below stricture. Moth-eaten appearance of ureter typical of tuberculosis. Diagnosis: tuberculosis of kidney and ureter.

Fig. 13. Stricture at ureteropelvic junction, resulting in complete destruction of kidney.

Resemblance to Intestinal Peristalsis. The rate of the ureteral peristaltic waves varies in rate in proportion to the extent of the kidney's activity. The waves begin at the pelvis and are discernible all the way to the vesical opening of the ureter. As has been pointed out by Quinby, the fact that they are initiated by an area of high metabolic rate in the renal pelvis and pass to one of lower rate below, is

closely analogous to peristalsis as exemplified in the intestine. It differs, however, in a very important particular. No evidence has ever been adduced to show that reverse peristalsis ever takes place in the ureter whereas this phenomenon is well established in the intestine. There has been observed, nevertheless, especially in

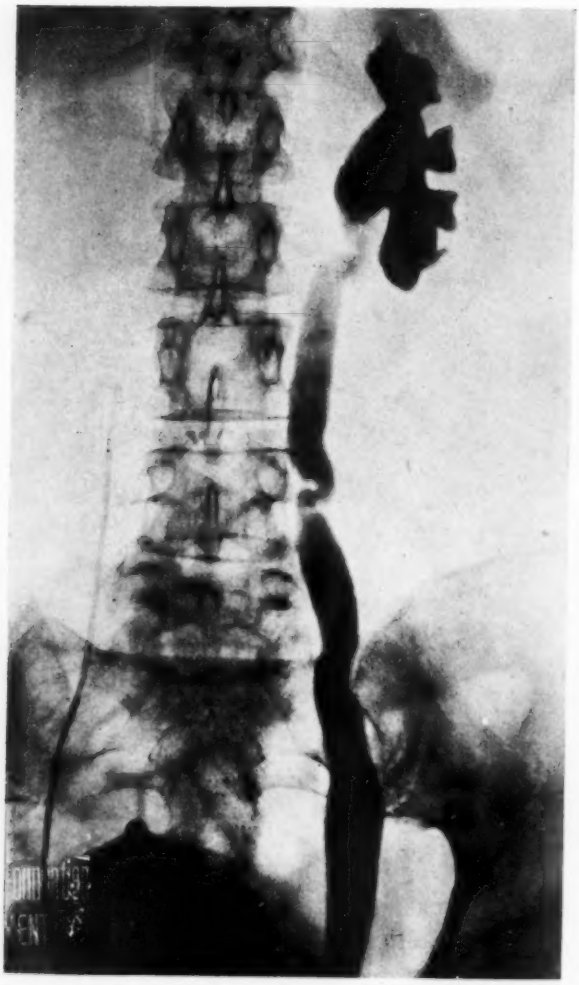

Fig. 14. Kinks; dilatated ureter with resulting hydronephrosis. Calculus present in mid-ureter.

experiments upon rabbits, that reflux of the bladder content into the ureter occasionally takes place.

Regurgitation from the Bladder: "Bladder Reflux." The question as to whether a vesicorenal reflux can exist under normal conditions, and the possibility of the existence of a demonstrable sphincter at the vesical end of the ureter, have been under investigation and discussion at intervals since the opening of the present century. As far back as 1908 it was found by Barringer that in diseased conditions of the ureter the vesical orifices may be rigid at a time when contractions are taking place in other portions of the duct. If urine were being excreted into the bladder at the same time, regurgitation would thus become possible. Yet, if the intravesical portion of the ureter is normal no such reflux of urine can occur. While some careful investigators have denied the possibility of reflux under any conditions from the human bladder, a survey of the evidence points strongly to the contrary. It was noted by Wislocki and O'Conor that when a moderate retention was produced in a rabbit's bladder which possessed good muscle tone, the ureterovesical sphincter was occasionally prevented from closing as it should normally do after each gush of urine. When this occurred the intravesical pressure projected a column of fluid into the ureters. If peristalsis was not going on, the reflux could not be readily induced, but when peristalsis could be stimulated, providing a moderate degree of intravesical pressure existed, the bladder content was almost always regurgitated. These investigators finally concluded that although regurgitation can be readily produced in the rabbit and less frequently in the dog, further observation would have to be made before one would be able to say whether a comparable phenomenon occurs in man. If it ever does occur, ascending infection could be readily accounted for. Nothing in their observations gave any weight to the theory of the existence of antiperistalsis in the ureter. Under pathologic conditions, with loss of muscle tone and alterations in the mechanism which normally prevents it, reflux of urine undoubtedly could occur in man.

Permanent Ureteral Dilatation. From the Clinic de Necker, Paris, in 1914, Legueu and Papin put out a careful review of previous work on the subject of permanent ureteral dilatation, and the

possibility of vesicorenal reflux under conditions of disease. They considered especially the investigations of Sampson and Hagner in the United States, and assented to the conclusions of these American authors that the pathologic states which permit gaping of the ureteral mouths and regurgitation of urine from the bladder into the ureters are of more common occurrence than is generally believed. Their conclusions from reviewing the literature and their own exhaustively investigated cases were that though this reflux exists in animals in normal health, in man it has not been demonstrated, though theoretically it is not impossible.

Under pathologic conditions such a reflux is shown (1) when the vesical content can be emptied through a ureteral catheter, as happened in five of the cases which they detail; (2) when an injection of opaque fluid into the bladder can be shown by roentgenography to flow into the upper urinary tract, filling not only the ureter but the calyces as well, and (3) when there is a reflux of urine from the opposite kidney by a nephrectomy wound. Conditions producing retention are well understood to make reflux possible; it is less well known that primary atony of

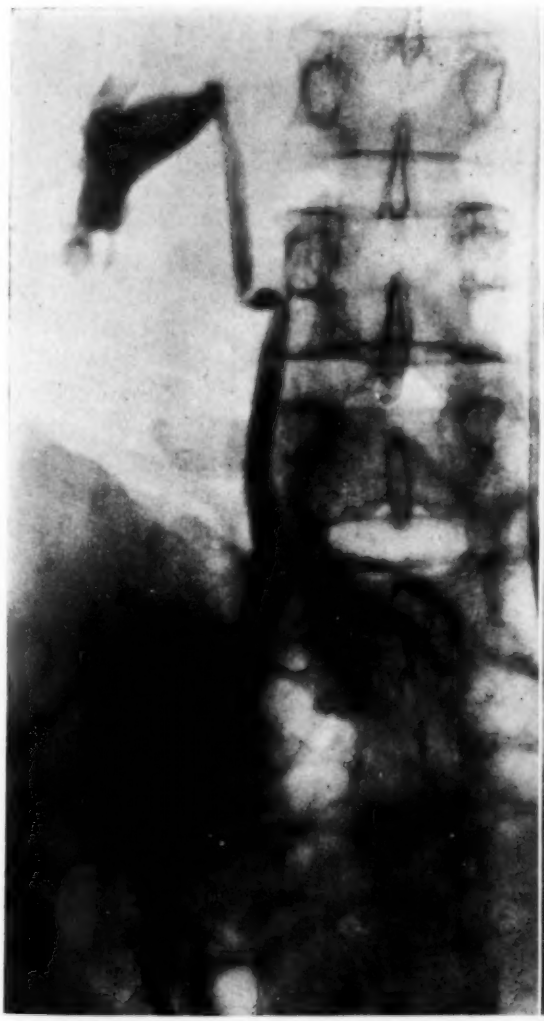

Fig. 15. Peculiar angulation, ureteropelvic junction, and L-shaped kink in ureter (erect posture).

Fig. 16. S-shaped kink in ureter with constant pain over McBurney's point, resulting in an appendectomy. Note the ptosed kidney. This roentgenogram will be particularly instructive to those urologists who believe kinks play no role in ureteral pathology.

the ureter and complete congenital dilatation of the duct may have like results.

Very recently, at the Italian Urologic Congress, Ravasini of Trieste presented a paper on this subject wherein he asserted that vesicorenal reflux may be readily produced by either primary congenital dilatation of the ureters, or by such

Fig. 17. Angulation of ureter, rare.

pathological conditions as ureteral tuberculosis, sclerosing periureteritis or ureteritis, or by bladder conditions such as distention and inflammation due to caustic action, or the presence of vesical diverticulum or new growths. Other conditions which he believes capable of inducing this reflux are trauma from stone or ill-advised instrumentation, prostatic hypertrophy or abscess or new growth of this gland, disease of the nervous system, and pregnancy.

Treatment of Bladder Reflux. Though much has been written concerning the mechanism and prevalence of vesicorenal reflux, there is little or no record of any measures which have been adopted to overcome or neutralize it. More than five years ago Quinby of Boston in a discussion of kidney affections gave it as his opinion that the so-called "ureteral chill" was dependent in most instances upon regurgitation into the ureters. He felt justified in assuming that when the bladder had been kept quiescent for a considerable period, as after a prostatectomy, it became hypertonic and on first resuming its function of expulsion of urine caused the reflux to appear, with the result of upward transfer of infected material to the kidney. Treatment then must be directed toward combatting the renal infection, and this he felt could be best accomplished by the administration of large quantities of water, by mouth if possible, or under some conditions by hypodermoclysis. The only drugs worth anything in Quinby's opinion are salol and hexamethylenamine* and "either of these is at best but feeble." Some other clinicians have had good results by proceeding as though obstruction had been positively demonstrated at the vesical neck, even though many cases are not capable of offering any such demonstration. Where the reflux is due to loss of tone of the bladder muscles, treatment directed toward its restoration will often prove effective. O'Conor of Chicago, in discussing a paper read before the Urologic Section of the American Medical Association in 1925, pointed out that antisyphilitic treatment might accomplish this, and a return to normal tone of the bladder musculature would abolish the reflux. He had frequently seen the same result in eliminating residual urine in the bladder by active systemic treatment, when all local treatment had, for some reason, to be avoided.

Ureteral Dilatation. As has already been mentioned in discussing anomalies, the ureter may be congenitally dilated. Most commonly, however, such dilatation

* In the author's present opinion, hexylresorcinol is more effective for some types of infection.

is a pathological condition but may be due to a variety of causes. The designation "megaloureter" was coined by Caulk to fit a single case which he reported, wherein there was a primary anatomical alteration in the ureteral wall. This is undoubtedly a very rare anomaly. The term, however, has lately been more loosely applied to those conditions in which the orifice at the vesical end of the ureter gaps wide open; "permanent dilatation of the ureteral orifice," the French have termed it, because no stricture or other obstruction can be postulated to account for it. The condition shown by these patients is such that if we were to turn them upside down when their bladders were full, the urine would flow back to the kidneys just as readily as it flowed from the kidneys to the bladder when the patient's head was uppermost.

An interesting contribution to the subject of ureteral dilatation was recently made by Carson, who found in 185 consecutive autopsies upon males that 23 showed some degree of this abnormality. In fourteen both ureters were dilated, five showed it upon the right only, and four upon the left only. Ureteral dilatation was accom-

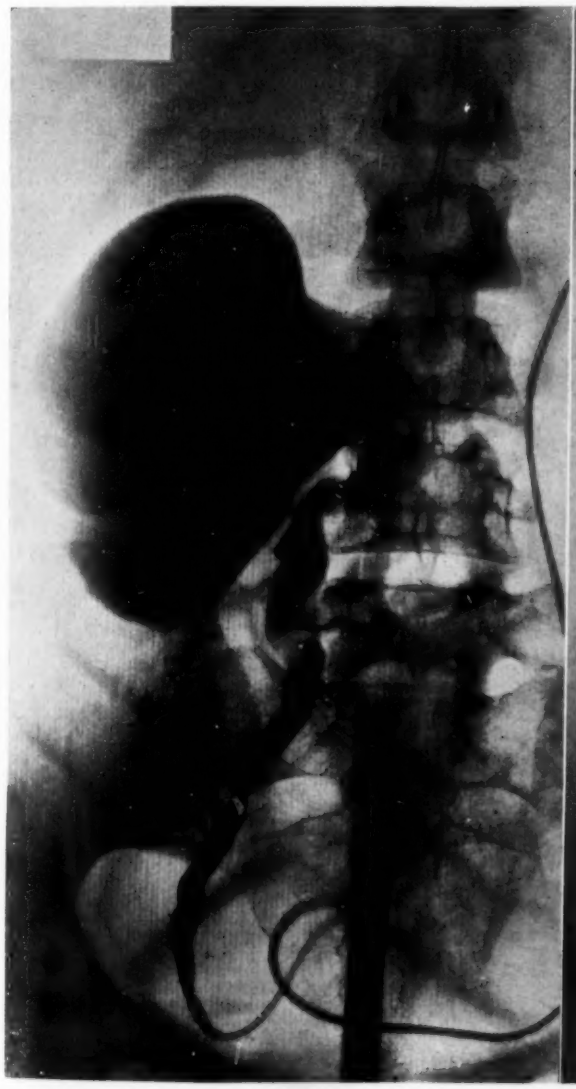

Fig. 18. Corkscrew ureter, resulting in pyonephrosis.

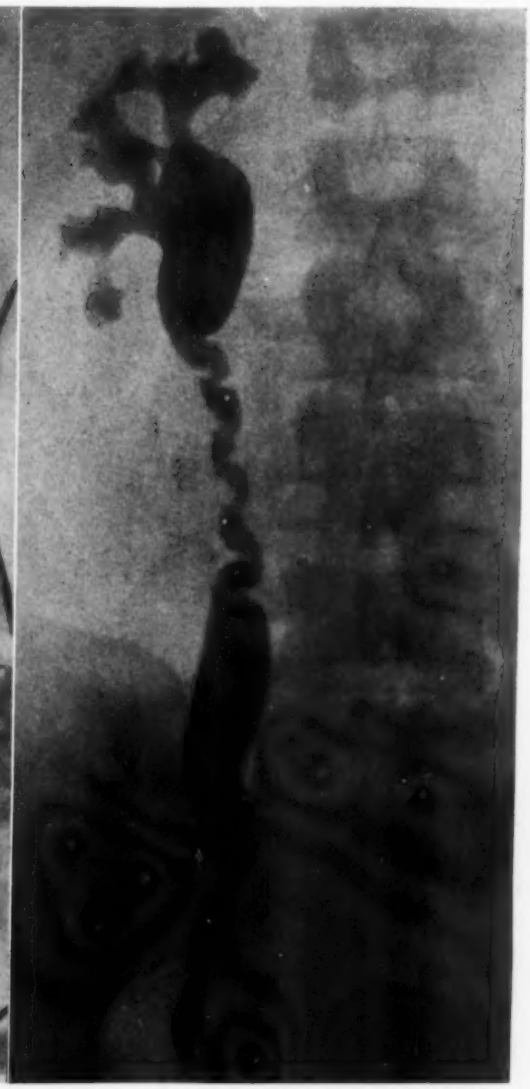

Fig. 19. Typical corkscrew ureter, resulting in hydropyonephrosis (tuberculous kidney).

panied by hydronephrosis in thirty-one cases and was evidently due to intravesical obstruction in eleven cases. Five subjects were found to present ureteral stricture also, and of these strictures four were of inflammatory origin and one, in an infant of the ureters. In the example offered to us by Caulk, the affected duct was repeatedly drained and irrigated with antiseptics without, however, having any permanent effect upon the septic condition persisting as a result of urinary infection. Caulk

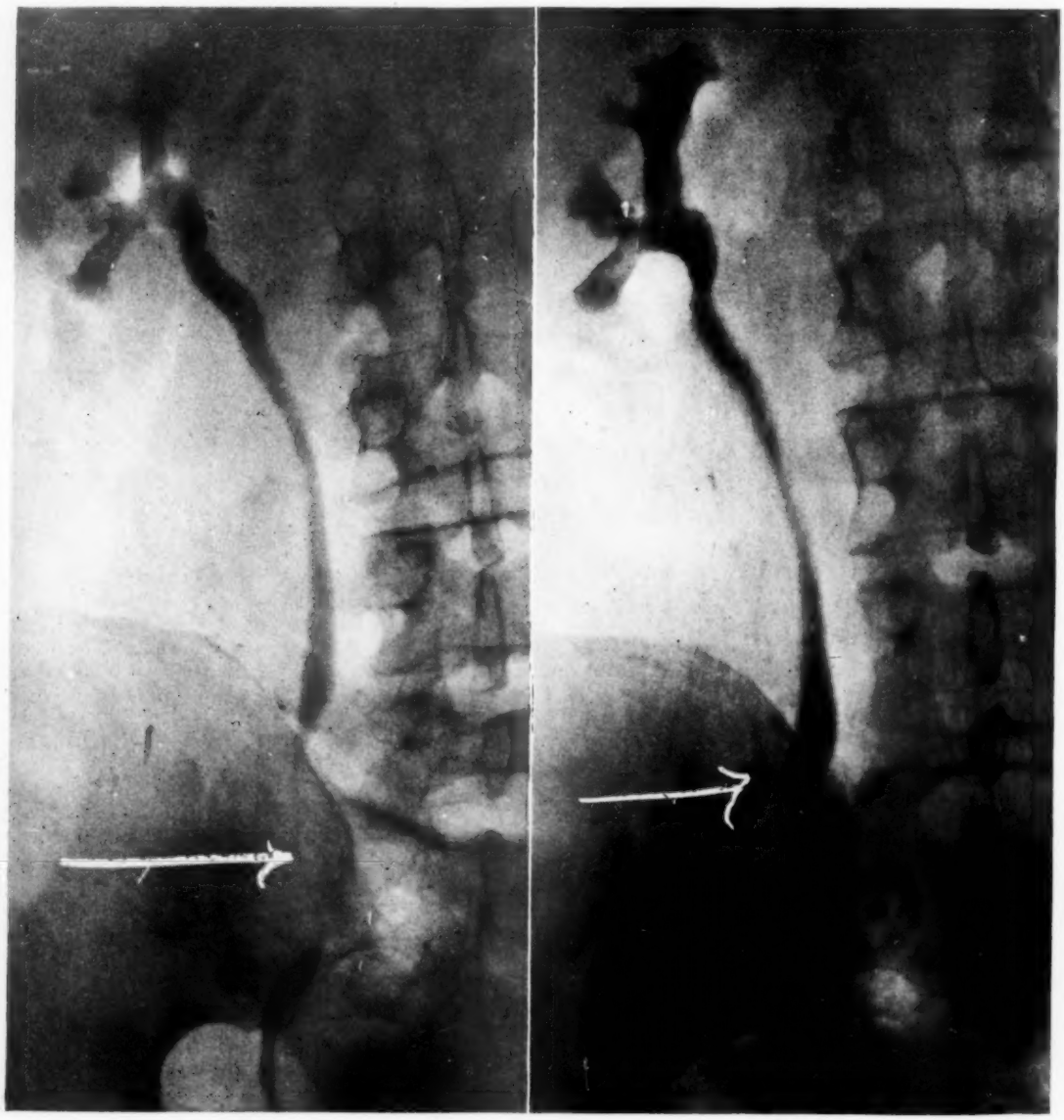

Fig. 20. Fig. 21.

Figs. 20 and 21. Spasm of ureter. Note length of constriction. Note dilatation where constriction was present. (Not constant nor persistent and longer than a definite stricture.)

who died on the sixth day, was unquestionably congenital.

Treatment of Megaloureter. What has just been said in regard to handling cases presenting a vesicoureteral reflux applies with equal force to permanent dilatations himself considered removal of the kidney notwithstanding the fact that it was sound, and in this Kretschmer, who also saw the patient, concurred. The less grave intervention of slitting the ureteral orifice with cystoscopic scissors was first tried and had

a temporary beneficial effect, enabling the patient to empty the ureter down to 2 to 4 ounces. But it was not until a far more extensive incision had been made with a specially devised instrument that any permanent benefit resulted. Thereafter the patient could empty the ureter under ordinary conditions but as soon as the bladder became at all distended its contents immediately backed up into the dilated duct and retention again occurred. (Fig. 6.)

Others have enlarged the ureteral orifice by fulguration, notably Gayet and Rousset in France and Petillo of this city. Geisinger of Virginia found all irrigations and local treatment absolutely ineffectual and finally took out the kidney, the patient immediately recovering and remaining in normal health thereafter. The French operators just mentioned also found it necessary to remove the kidney in several cases. Dillon of San Francisco treated two patients with dilated ureters attended by vesicorenal reflux by means of irrigations with boric solution very gently injected, following this by instillation of 2 per cent mercurochrome. He found that under this regimen they made much better progress than with kidney lavage. The hips were elevated and the patients instructed to hold the solution as long as possible. Free drainage must be established without fail, and with proper attention to this, together with suitable antiseptics to combat the infection, it would seem that except in the most severely infected cases it would hardly be necessary to remove a useful kidney.

That the majority of strictures are congenital in origin is the contention of C. K. Smith of Kansas City, who believes that if these cases could be seen in their earlier phases, which at present very seldom happens, it would be shown that congenital

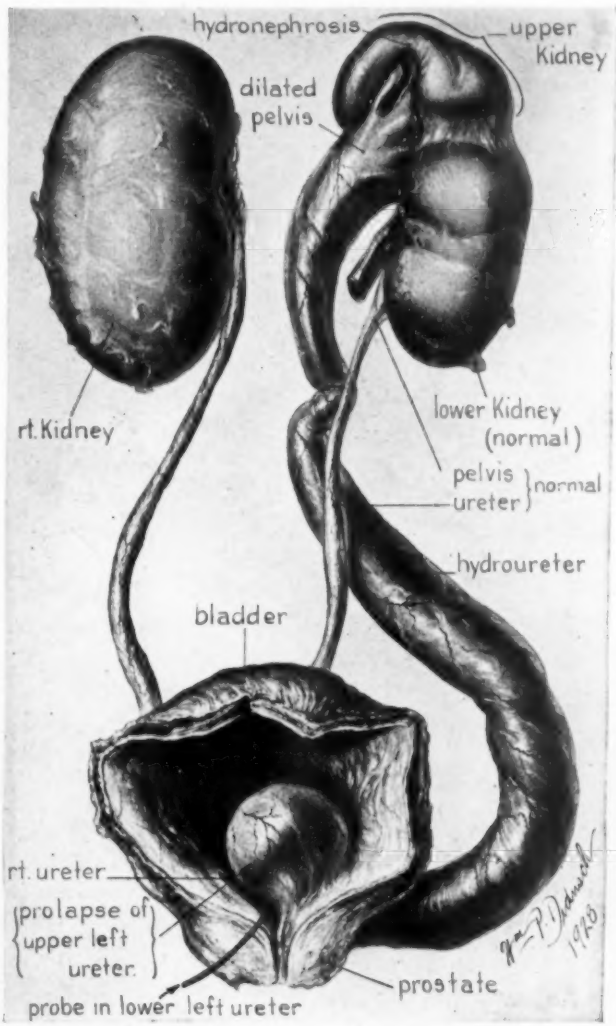

Fig. 22. Hydronephrosis; normal ureter and hydroureter on left kidney; ureterocele. Courtesy, Dr. Christeller, Virchow Krankenhaus, Berlin.

URETERAL INFECTIONS

Infection within the ureter is so closely allied with strictures and other obstructions that one can hardly be considered apart from the other. It is the opinion of Hunner, to whom we owe much of our present knowledge regarding ureteral stricture, that these lesions are in most instances originally due to focal infection, often quite remote from the urinary tract. malformation with disturbed ureteral function and stasis is the primary factor which decides the place where involvement begins, and that this may very well result in the formation of connective tissue with inevitable greater decrease in the size of the ureter's lumen. The researches of Hunner have also gone to show that when a ureteral calculus is found in a densely strictured

area, the encapsulating scar tissue is not so much due to the irritation induced by the stone's presence, as is the deposit of the stone in that particular place due to the previous existence of the stricture.

Ureteritis. Primary inflammation of the ureter is probably a rare occurrence. In my own experience I have seen but one case. This patient showed absolutely nothing pathological in the renal pelvis or parenchyma, but the attached ureter was completely filled with granulations which suggested tuberculosis. This infection was completely ruled out, however, so that we could not but conclude that the inflammation was primary to the duct itself.

Inflammation, in the lower section of the ureter especially, is probably responsible for a great deal of pelvic pain which is regularly referred to other causes. It has been found that some of the most extreme cases of dysuria in women could be traced to this cause. The infection may be either a lymphatic extension or may be secondary to a distant focus. Possibly obstruction and urinary stasis may contribute in some degree but this will not account for the cases of megaloureter of which mention was made previously. In these infection is always present yet no obstruction can be demonstrated.

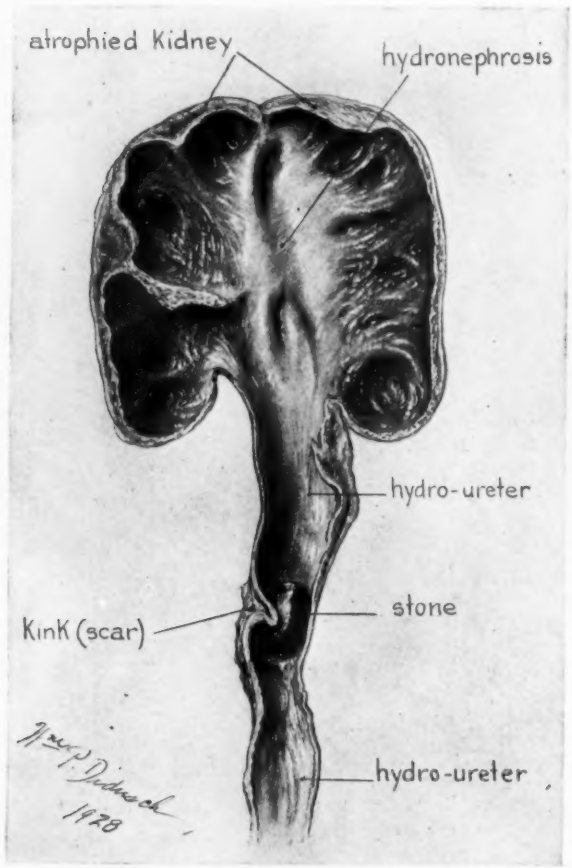

FIG. 23. Calculus, resulting in complete destruction of kidney. Courtesy, Dr. Christeller, Virchow Krankenhaus, Berlin.

FIG. 24. Showing corkscrew dilator above calculus in process of removal.

Focal Infection. If we accept the contention of Hunner, ureteral stricture or simple chronic ureteritis may be the outcome of diseased conditions in the throat or mouth, less often in the sinuses, and possibly occasionally in the lower part of the alimentary tract. The original infection may perhaps be first arrested by the lymph glands in the region of the ureter, the causative organisms then being taken up by the walls of the duct, with resulting inflammation and infiltration. In many cases of ureteritis, the infection will descend so far as to involve the trigone, thus

producing highly distressing vesical symptoms, all of which subside as soon as the ureteral condition is controlled, even if nothing whatever has been done in the bladder.

Ureteritis Cystica. A very rare form of ureteral inflammation which has received practically no attention in urologic textbooks is ureteritis cystica. This affection is characterized by multiple minute cysts of the mucosal lining, usually of the vesical end of the ureter. Microscopically they are shown to be inclusion cysts of the lining epithelium. A very interesting specimen of this affection was shown by Bond Stow before the New York Pathological Society some twenty years ago, and so far as I have been able to discover, no adequate discussion of the condition has since appeared in the literature. In 1924 Aschner reported having seen four cases in Beer's service at Mount Sinai Hospital, New York. The remarkable feature of Stow's case was that it presented complete

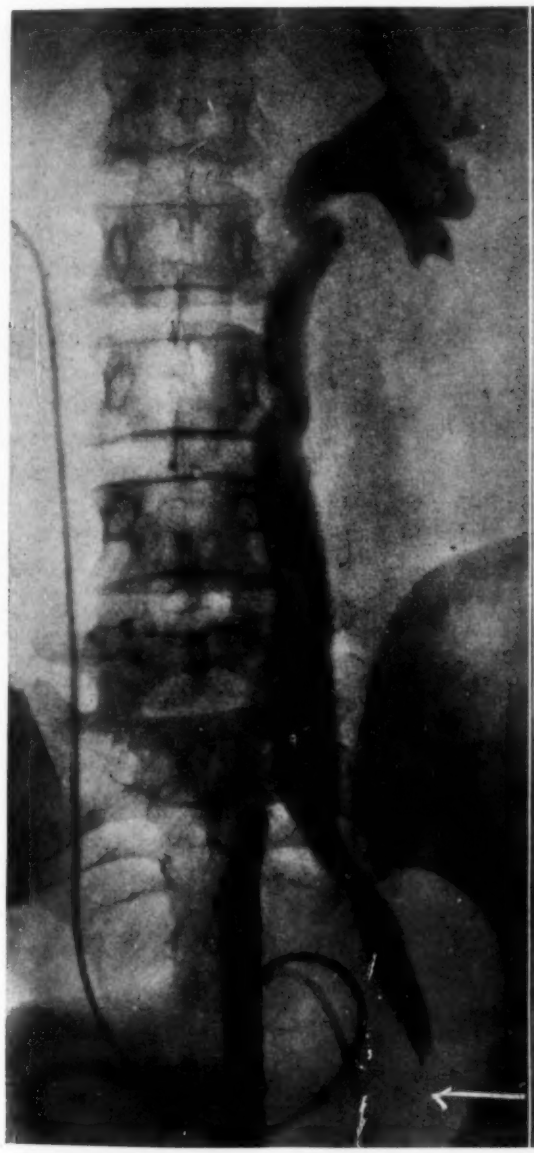

Fig. 25. Calculus with resulting dilatation.

Fig. 26. Calculus in lower end of ureter with resulting dilatation of ureter and hydronephrosis. Stone removed, ureteral dilatation and irrigation. Uneventful recovery.

bilateral duplication of the ureters, though each pair of ureters united outside the vesical wall and entered through the normal opening as a single duct. Each one of the four ureters from its origin to within 4 cm. of its entrance into the bladder was thickly studded with cysts, varying from the size of a millet seed to that of an ordinary pea. Some cysts were isolated, while others appeared in groups; some were transparent and contained a clear serous fluid; others were opaque and grayish-yellow in color, filled with a ropy colloid material; still others were much harder than the majority, their contents being resinous and of a glue-like consistency. Similar cysts were scattered throughout the renal pelvis, but the bladder was entirely free from them. All of the cases reported by Aschner had bladder involvement; indeed, the lesions appeared to have originated in the bladder and progressed to the ureters secondarily. More recently a case has been reported from Australia; it was there related, but merely in theory without biologic or histologic proof, to a disease prevalent among cattle in certain sections of the country known popularly as "red water." Autopsy upon some of these animals showed no extensive urinary tract lesions other than minute cysts scattered over the mucosa of bladder and ureters and occasionally found also in the kidneys. The latest case reports on ure-

Fig. 27.

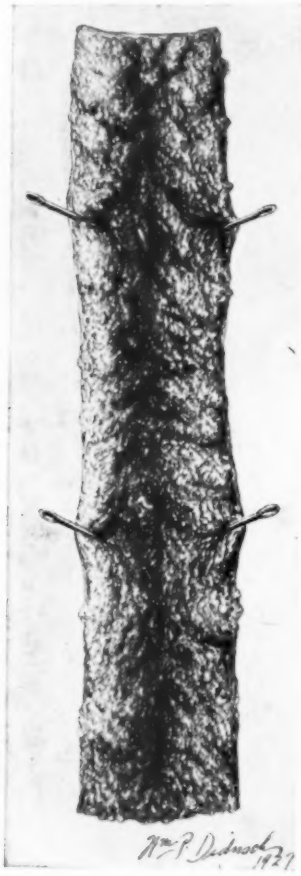

Fig. 28.

Fig. 29.

Fig. 27. Papilloma of ureter (slight hydronephrosis). Courtesy, Dr. Marion, Service Civiale, Hopital Lariboisiere, Paris.

Fig. 28. Papilloma of ureter. Courtesy, Dr. Marion, Service Civiale, Hopital Lariboisiere, Paris.

Fig. 29. Papilloma of base of ureter and of ureteral meatus. Courtesy, Dr. Legeau, Museum Felix Guyon, Hopital Necker, Paris.

teritis cystica I have been able to find are the three German ones published by Knack in 1926. (Fig. 7.)

Venereal Infections of the Ureter. Gonorrhea and syphilis are apparently only secondary invasions of the ureter. Ureteral syphilis is not mentioned in any literature that has come to my notice, and secondary infection with the gonococcus is evidently an extremely rare finding. The possibility of vesical syphilis extending to the ureter is, however, perfectly evident to anyone at all familiar with urinary tract pathology, but in common with other infections it is doubtful if it could ascend so long as the mechanism which prevents reflux into the ureters remained in normal condition. The characteristic luetic bladder ulcer is more likely to appear about the ureteral orifices than anywhere else, and where dilatation has previously taken place invasion of the ureteral lumen will be a very likely sequel.

We have it on the authority of Thomson, the English writer, that gonorrheal cystitis may extend to the ureters, the renal pelves and even occasionally to the kidneys themselves. The opponents of the theory that ascending infection may be held responsible for such an occurrence can attribute this only to blood-borne origin, but I am inclined to believe that preceding megaloureter or even a mild degree of ureteral dilatation it must in the majority of cases be the deciding factor. Any such infection is likely to be chronic rather than acute, and very frequently the patient will present no symptoms which can be in any way referred to a venereal infection in this part of the urinary tract. The symptoms of ureteral gonorrhea are by no means characteristic. There may be a slight rise of temperature, and pressure on the angle formed by the lowest rib and the erector spinae muscle may elicit some slight tenderness. There may be intermittent pyuria or pus will appear continually, with easy demonstration of the specific organism on urinalysis. The final diagnosis will rest upon the observations made through the cystoscope. The ureteral orifices will appear red and patulous, often with pus oozing from them, and analysis of the specimens obtained by ureteral catheterization will confirm the visible symptomatology.

Tuberculosis of the Ureter. Infection by continuity is probably the manner in which most cases of ureteral tuberculosis arise. It is now quite well established that vesical tuberculosis is practically always secondary to an earlier focus in the kidney and it would be highly probable that the ureter would become involved even earlier than the bladder. As a matter of clinical experience, however, many patients are seen with extensive lesions in both kidney and bladder, but with a wholly normal

Fig. 30.

Fig. 31.

Figs. 30 and 31. Polyps of the ureter. Courtesy, Dr. Marion, Service Civiale, Hopital Lariboisiere, Paris.

ureter communicating between them. No doubt hematogenic infection as well as extension through the lymphatics may occasionally take place but descending infection from the kidney is very evidently the etiologic factor in most cases of ureteral tuberculosis.

Tuberculosis of the ureter is especially

Fig. 32. Cancer of the ureter. Courtesy, Dr. Legeau, Museum Felix Guyon, Hopital Necker, Paris.

important in relation to stricture, for a healed focus might readily account for such a lesion which could not be traced to any other source. To the surgeon operating for the removal of a tuberculous kidney the complete removal of an infected ureter is essential, for failure to clear away this source of infection may continue and aggravate a vesical condition which would otherwise subside and probably clear up entirely, following removal of the original focus in the kidney. (Figs. 8 and 9.)

URETERAL OBSTRUCTION

Mention has already been made of the indebtedness of the medical profession in general and urologists in particular to Hunner for the work which he has done in regard to ureteral stricture. Before he made known the results of his researches medical men generally knew little about this lesion and probably cared even less. It was many years before the Baltimore urologist's views were accepted but at present there are very few who now dispute his conclusions, even if they refuse to believe that ureteral stricture is so common an occurrence as he maintains it to be. It should be borne in mind, however, that the ureter is subject to considerable variation in caliber even in perfectly normal individuals, and the normal constrictions may be some distance away from the positions usually assigned to them, so that an exploring bougie might easily impinge upon one of them in an area which even a good anatomist would consider free from any congenital narrowing. In the interpretation of pyelograms it behooves us to be careful not to mistake a temporary local spasm, perhaps induced by the presence of the foreign opaque medium, for a permanent constriction; neither should we jump at the conclusion that an inflammatory dilatation is mechanical.

Stricture of the ureter is very likely to be bilateral, according to Hunner, and when the lesion has been established in one ureter it is well always to make careful examination of the opposite side. The lesion undoubtedly plays a very important part in genitourinary pathology. Without stopping to discuss whether the congenital or the acquired type is the more frequent, it is evident that when inflammation has once been set up, if it chances to occur near one of the natural narrowings of the

urinary duct, obstruction will take place sooner than if the lesion were located in an area where the lumen is wider. As tuberculosis is one of the most frequent causes of inflammation in all parts of the urinary tract, the ureter naturally does not escape; yet examples of tubercular ureteral strictures are not very numerous as yet. All with an anomaly. Some years ago the Californians, Hale and von Geldern, found a diverticulum some 10 cm. above the vesical orifice with a structure just below the diverticulum. Ureteral diverticulum is as rare as stricture of the same duct is common; the one shown in Figure 33 is a decidedly unusual finding.

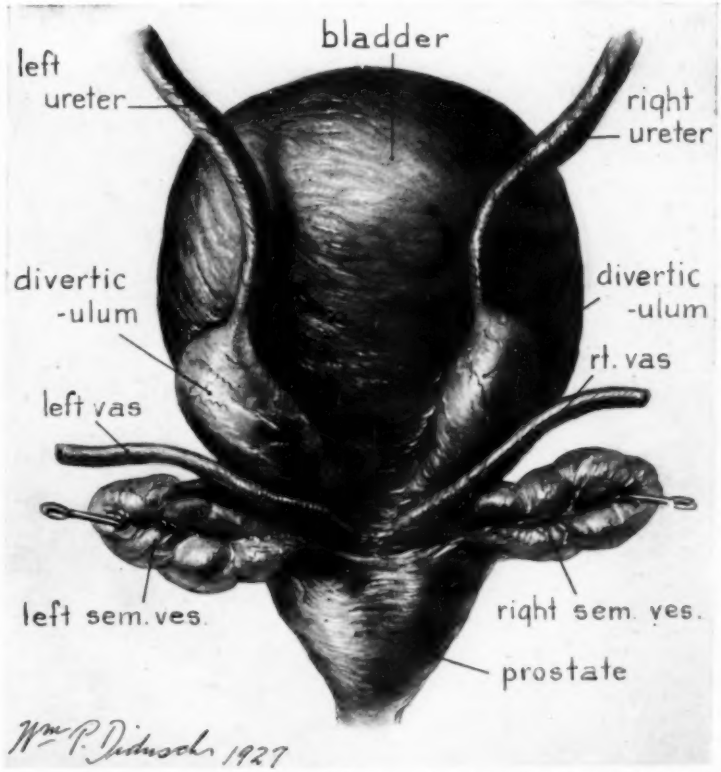

Fig. 33. Diverticula of ureter. Courtesy, Dr. Marion, Service Civiale, Hopital Lariboisiere, Paris.

types, however, are being encountered with ever-increasing frequency as our methods of diagnosis, especially the roentgenologic ones, improve and achieve greater exactness and clarity. This does not mean that there are actually any more strictures; we are now more likely to demonstrate their existence. In any case where some pathologic condition in the upper urinary tract is obscure and defies discovery by routine examination, stricture of the ureter, either partial or complete, may be at fault, and this possibility should never be forgotten. It is well to remember that stricture may very readily exist in conjunction with other lesions, or be present together

The latest published studies on ureteral stricture, reports of which were made a few months ago by Schreiber, list as prime etiological factors in the pathogeneisis of this lesion: (a) congenitally accentuated narrowing of a congenital physiologically narrow site; (b) extension of inflammatory processes into the ureteral wall from adnexal disease with and without thrombophlebitis, and advanced chronic cystitis; (c) the occluding kinking power of crossing anatomical structures, namely, the vas deferens in the male and the uterine artery in the female. This investigator thus restricts considerably the etiologic factors previously postulated by Hunner, though

he takes a broader viewpoint than some of the men with whom he has been closely associated, notably Edwin Beer, who recently put himself on record* as remaining unconvinced that ureteral stricture is a common lesion, that it is usually bilateral, that it is due to focal infection, or that Hunner's method of diagnosis by the wax bulb is perfectly reliable. It is my personal opinion, however, that Schreiber's work, based upon 100 consecutive autopsies, is in large measure a confirmation of Hunner's contentions, and that our present clinical procedure will be successful only in the measure that we are willing to proceed along the lines he has marked out for us.

Fig. 34. Congenital short ureter with congenital ptosed kidney and pyonephrosis.

Fig. 35. Double ureter and double kidney on right side, with single ureter on left.

Ureteral Kinks. The demonstration of kinks of the ureter requires careful pyelography. So often do they appear in the pyelogram that the finding may be regarded as a mere accident and its significance underestimated. Before we learned to withdraw the catheter below the upper limit of the bony pelvis so as to be able to take a picture when the ureter no longer contained anything firm enough to straighten it out and stiffen it, we doubtless missed a great many kinks which doubled up again as soon as the catheter was withdrawn. Yet the fact that we no longer miss them as we used to do is no reason for our regarding them as being of less importance. They undoubtedly account for much otherwise unexplained abdominal pain, and by obstruction of the ureter set up pyelitis and induce various forms of renal pathology which are wholly unassociated with movable kidney, the condition in connection with which we are most apt to think of kinked ureter. (Figs. 14 to 17.)

On the other hand it is possible to produce a kink artificially, as has been pointed out by Eisendrath. In injecting media for pyelography the catheter may

*Am. J. Surg., 1927, iii, 59.

be pushed up close to the kidney, and a picture taken at this time will show the ureter kinked between the pelvis and the end of the catheter. If a second exposure be made after the catheter is withdrawn there will be no kink visible. This illustrates the unwisdom of depending upon a single exposure.

Spastic Obstruction of the Ureter. At times instrumental exploration of the ureter may be found impossible and the impression be gained that we are dealing with an impassable stricture. It must be remembered, however, that if secretion by the kidney is for any reason temporarily suspended, as is likely to happen from the psychic effect of the examination alone, the unmoistened lining mucosa of the ureter will offer effective resistence to the passage of the catheter. If the apparent obstruction is at the ureterovesical valve, the existence of spasm should be strongly suspected. (Figs. 20 and 21.) A pyelogram made after the failure of the instrument to pass often shows nothing obstructive at the point where its progress was arrested. Sometimes if the catheter is withdrawn and a short interval of time allowed to elapse before it is reinserted, the secretion of urine will have resumed and the tip pass the point where it was previously obstructed without any trouble whatsoever. It may be said here, as will be much more strongly emphasized when we consider the removal of ureteral calculi, that in no part of the body is more patience and thoroughness required of him who undertakes to explore and correct its irregularities and diseases than in the ureter.

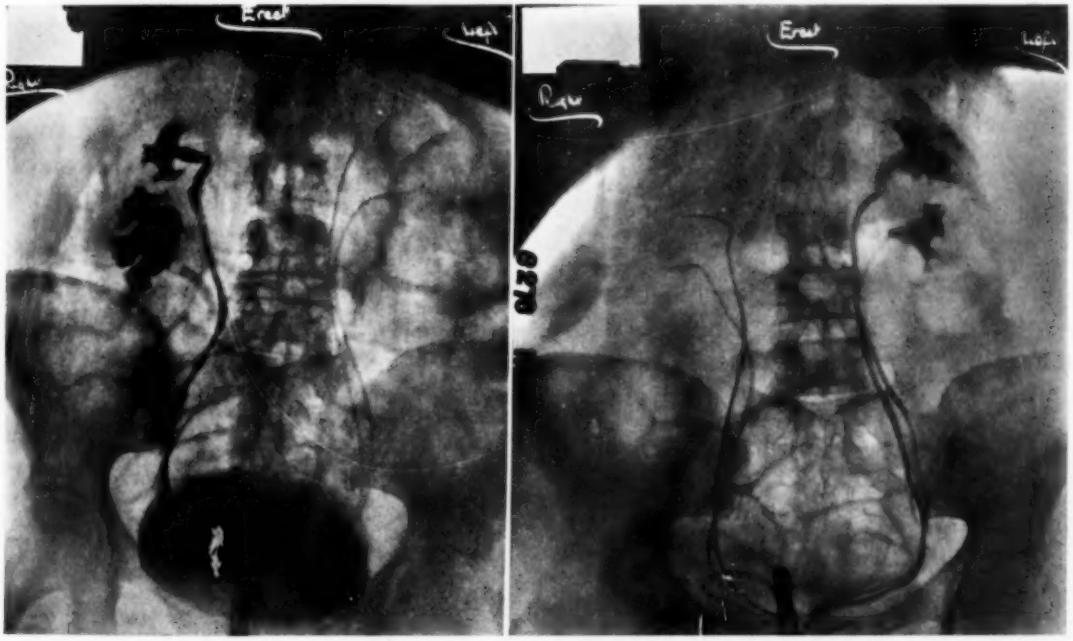

Fig. 36. Author's case of complete double ureter and double pelves on right and left side, with a pyonephrosis due to kink on right side. Catheterization of both ureters, catheters (No. 7) left in situ; irrigation with 1:1000 acriflavine for 72 hours. Uneventful recovery.

Ureterocele. Cystic dilatation of the vesical end of the ureter has been generally looked upon as a congenital anomaly. Its occurrence in adults, however, and the greater frequency of its appearance now that pyelography and other diagnostic measures have reached their present usefulness, has tended to indicate that the condition is more often acquired than congenital. Petillo has attributed the condition to two factors: (1) a lesion at the end of the extramural portion of the ureter, acting upon the nervous or muscular elements so as to diminish or altogether abolish ureteral

peristalsis in the distal portion of the duct, thus paralyzing the intramural portion; continuous pressure from above would tend to dilate this atonic portion; (2) a narrowed ureteral orifice would have to exist in addition to the lesion; otherwise the entire ureter would be more likely to undergo dilatation. Ureterocele would be produced in inverse proportion to the size of the meatus; a narrow orifice would produce a larger ureterocele than a more generous one.

The diagnosis can be made only by cystoscopy. As Damon A. Brown has said: "The glistening cystic tumor located at one or the other ureteral orifice and ballooning and retracting according to the influx of urine, could not be mistaken for any other condition." Various kinds of treatment have been instituted by different writers upon this condition but the greatest success seems to have attended fulguration. In a few cases manipulation with the catheter and systematic dilatation have served to reduce the cystic condition but destruction is likely to prove most satisfactory in the long run.

Prolapse of the Ureter. Cystic dilatation of the vesical end of the ureter has been mentioned as probably in most instances a congenital anomaly. In the few cases of prolapse of this portion of the duct which have been put on record, the condition has usually been mistaken for some type of cystic dilatation. A year or more ago Mercier collected six cases of ureteral prolapse, to which he added one which had been seen in Marion's clinic in Paris. According to the histologic and clinical observations of this writer, prolapse may sometimes be due to over-violent contractions of the ureter, but a predisposing weakness in the structure of the wall must be present to make such an occurrence possible. A certain amount of redundancy, such as was postulated as a frequent cause of kinks which have no pathological significance, would also seem a reasonable accompaniment to conditions inducing prolapse. Mercier even goes so far as to suggest the existence of an abnormal valve at the ureteral meatus which shuts off the flow of urine intermittently and thus stimulates the ureter to abnormal peristalsis. But when we come to consider how many conditions can occur to cause blockage at the vesical orifice without going to the trouble of imagining anomalous structures such as "valves," this hardly seems necessary. A perfectly normal ureter will hardly prolapse, no matter how much disturbance in its performance of function may be induced by blockading its outlet. The previous existence of stricture with subsequent dilatation, of calculus formation with resulting trauma and stretching of the ureteral wall, would certainly provide definite etiologic factors sufficient to account for those few instances where prolapse of the ureter has taken place.

As a rule such an accident causes no symptoms, and it is only on cystoscopic examination for something else that its existence may be discovered. It is easily differentiated from congenital cystic dilatation because it is easily reduced by the catheter, and when the lesion which was instrumental in producing it has been suitably treated and abolished, the prolapse is likely to be cured at the same time. It may possibly be necessary to treat it in the same manner as the prolapsing female urethra is handled: destruction of the prolapsing portion and enlargement of the orifice if this seems to be necessary.

Ureteral Calculus. In considering stone of the ureter we must differentiate between those which originate in the duct itself and those which form in the kidney and are later forced into the ureter by the outflow of urine. The majority of stones first recognized in the ureter probably originate in the kidney, but it was demonstrated many years ago by Rovsing, and later by Hunner, that constriction and obstruction of the ureter offer favorable conditions for the production of calculi directly at the site of the lesion.

Stricture and stone formation are the

forms of ureteral pathology which most often give rise to symptoms which are wrongly attributed to other organs, the appendix and gall-bladder most frequently. Their role not only in diseases of the urinary tract but in abdominal affections generally thus becomes a very important one, and differential diagnosis at times is a highly difficult matter. Pyelography will in most cases establish the existence of the ureteral stone and, together with obstruction to the passage of the catheter, may be regarded as conclusive evidence, but in many instances the patient does not come into the hands of the urologist until the internist and general surgeon have exhausted their resources, and may have undergone several operations in a vain effort to ease his sufferings.

On the other hand stones may often lie in the ureter for years without causing any symptoms whatever. Many, when removed, show a deep groove at one side, through which the urine freely passed, and it was only when something occurred to alter its position so that the ureter's lumen was occluded that the stone caused obstruction with the production of renal colic or even eventual destruction of the kidney.

The removal of ureteral stones offers a very nice problem to the surgeon and calls for the exercise of his best judgment and critical faculties. Ureterotomy is a very serious procedure and should only be undertaken when all hope of removing the calculus by any other means has had to be abandoned. By the employment of modern expedients and the exercise of unlimited patience and perseverance, most stones can be made to pass. Sometimes ureteral catheterization alone will relieve the symptoms and dilate the ureter below the point of impaction of the stone sufficiently to make it move downward to the bladder where it can be easily grasped and extracted. At others, repeated dilatations, sometimes extending over many months, have been necessary before the calculus finally appeared.

Various methods of manipulation of calculi intraureterally are employed, but I think the experience in most clinics has been similar to ours; no one method is applicable to all cases. Crowell has for a number of years used and warmly advocated a combination of ureteral anesthesia with dilatation by means of instruments. Oil is sometimes injected to aid in the passage of the catheter beyond the stone, and in different cases fluorscopy may be brought into play to give information as to the progress of metal dilators and prevent accidental pushing of the stone back into the kidney pelvis. As far back as 1918, Bugbee reported the successful extraction of a large calculus lodged in the lower portion of the ureter, which was effected by twisting a soft catheter in the fingers until it coiled in a loop about the stone which was then drawn out as in a sling. The catheter is rendered soft by boiling. Several roentgenograms were published showing the catheter coiled about the stone in the ureteral lumen. Wax-tipped catheters and bougies are useful in the types of stone which do not cast definite shadows in the roentgenogram and may otherwise remain unsuspected, but once the diagnosis is established patience on the part of everyone concerned will usually be the deciding factor. It requires not a little persuasion to induce a patient to submit time after time to cystoscopy, but often the thought that he is avoiding a serious and possibly fatal operation may keep him steadfast in the face of repeated failures to dislodge a stone. (Figs. 23 to 26.)

TUMORS OF THE URETER

Neoplasms of the ureter are very rare findings. Culver who made a search of the literature in 1921 could find but sixteen cases of ureteral papilloma, while Aschner the following year collected only forty-seven ureteral new growths of all types. In the latest publication I have seen on this subject, that of R. Leslie Stewart of Edinburgh, five more cases were added, making with Stewart's own case but fifty-three

known cases of tumors primary to the ureter.

Papilloma. Benign growths appear to be even more uncommon than malignant ones but this may very well be because all ureteral neoplasms tend toward malignancy and probably do not produce correctly appreciated symptoms until they have ceased to be benign. Papilloma developing in the ureter is in every way similar to like growths in the bladder or renal pelvis. It presents a vascular stroma, branching typically, covered with multiple layers of transitional epithelial cells which are in marked contrast to the underlying connective tissue. Small round cells are often found in this underlying connective tissue, suggesting a preceding inflammation due to irritation which may possibly be indicative of some irritative factor in the production of the neoplasm. Commenting on the literature, Culver tells us that in three of these cases calculus was intimately associated with the neoplasm; one had a partial ureteral duplication, one a diverticulum at the site of the tumor and one a duodenal renal pelvic fistula, presumably caused by stone. It is a question, however, whether these associations had an influence on the occurrence of the neoplasm or whether some of them at least were not caused by the neoplasm and had arisen subsequent to its formation.

The reported cases show that ureteral papillomata may be located in any one of three positions. In the first the entire ureter may be involved, and the renal pelvis and bladder at the same time. In the second the renal end of the ureter only will be affected, with part or all of the renal pelvis. Again it may be that in addition to the second situation the last inch or so of the duct may be affected, with the portion which lies between the two areas of papilloma apparently normal. According to Stewart, if these tumors occur at the lower end they may be extruded through the ureteral orifice and be engrafted on the adjacent vesical wall. Marion has reported a case where it was necessary to remove the ureter because of a profuse papillomatosis, five years after the corresponding kidney had been taken out for a similar condition. Between these two major operations fulguration of similar growths in the bladder had been several times carried out. (Figs. 27 to 29.)

Malignant Neoplasms of the Ureter. The few cases of primary malignant growths of the ureter gave symptoms practically identical with similar tumors arising in the kidney. Hematuria is often the only indication, but if the bleeding is excessive the passage of clots may cause the most intense pain. The clots are frequently almost complete casts of the ureter, and may even be voided in long strings looking like "angleworms." Less definite hematuria is the rule, however, and because the symptoms are not in any way peculiar to ureteral location of the lesion, differential diagnosis is likely to be difficult. Like other malignant growths, cancer of the ureter almost always appears late in life, so it may be the more readily distinguished from renal tuberculosis which produces some of the same symptoms but is found among younger patients. In the same way we may be able to rule out stricture and stone, but if there is any reason to believe that malignancy may be existent, all instrumentation should be applied with great caution. Complete ureterectomy and nephrectomy offer the only certain means of removal, but in patients advanced in years or greatly depleted by excessive bleeding such measures may be out of the question. Several patients so treated have survived for years and finally died of something else. A few authors also report good results from fulguration of growths close to the vesical meatus. This, however, would be of little avail in cases of established malignancy. (Figs. 30 and 31.)

In the course of a number of years devoted to clinical observation upon the urinary tract I have become convinced that what Saint James said of the tongue may be applied with equal truth to the

ureter: It is "a little member" but is capable of kindling "a great fire," and the importance of its role in a great majority of urinary tract diseases is even yet not so fully appreciated as it should be.

SUMMARY

1. The history of urinary surgery indicates that comparatively little attention was given to the anatomical importance of the ureter until very recent times. The introduction of safe methods of pyelography has done more to familiarize the surgeon with this duct and its pathology than any other single factor.

2. Embryologically the ureter takes its origin as a bud from the lower end of the Wolffian duct, close to its point of opening into the cloaca. When the cloaca disappears in the process of development, the ureter acquires a separate opening and a bulbous tip which later splits in two indicating future division into calyces. Incomplete or double ureter probably comes from a premature bifurcation of this tip, or an abnormal split which includes the stalk. Most anomalies of number and form probably arise at this point in fetal development. Huntingdon contends that double ureters have separate buds.

3. The most important points in the anatomy of the ureter are its areas of narrowing and the arrangement of muscle fibers at its vesical end which serve to prevent regurgitation from the bladder. The exact nature of this mechanism is not well understood but it is the present writer's opinion that there is a definite arrangement of nerves and muscles which serves the purpose of a sphincter. Regurgitation is very likely aided also by ureteral peristalsis. Under conditions of disease dilatation of the ureter undoubtedly occurs and the condition known as *megaloureter* is established, wherein rise of pressure within the vesical cavity may force the contained urine back into the ureters even entirely to the renal pelvis.

4. Stricture of the ureter is a definite clinical entity, occurring somewhat frequently in urologic practice though perhaps not quite as often as some enthusiasts would have us believe. Pathologic stricture is more likely to take place at the points of anatomical narrowing, and calculus formation is undoubtedly favored by the existence of infection in these strictured areas, the stone being a result rather than a cause of the stricture as has been generally believed.

5. Ureteritis cystica is a rare form of ureteral inflammation to which little or no attention has been given in textbooks. The condition is not peculiar to the ureter but may be present in bladder and renal pelvis as well. Ureterocele, or cystic dilatation of the lower end of the ureter, should not be confused with ureteritis cystica. This may possibly be congenital in a few instances but is much more reasonably regarded as a gradually progressive condition acquired through many years. Ureteral prolapse is a separate entity.

6. Primary infections of the ureter are not very common; while the ureter may be infected by venereal diseases, tuberculosis and so forth, this is usually only an extension from kidney or bladder. Tuberculosis is undoubtedly a frequent cause of ureteral stricture and obstruction.

7. Ureteral calculi may have formed in the kidney and descend to the ureter, or they may originate in strictures or from other causes in the ureter itself. They should be removed by intravesical manipulations if possible. Patience and perseverence will usually accomplish this, and surgery should be only a last resort.

8. Tumors of the ureter are a rare finding. Polyps are occasionally encountered, and benign papilloma has been reported in a few instances. Malignant neoplasms primary to the ureter are very seldom seen. Complete removal of any neoplasm should be promptly undertaken, as all benign growths tend rapidly to become malignant.

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SURGICAL TREATMENT OF CLEFTS OF THE PALATE AND LIP

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CONGENITAL clefts of the palate and lip have been the subject of many articles in both medical and dental literature for years. The subject has attracted special attention in recent years because there are so many surgeons who are paying especial attention to the specialty of oral and plastic surgery and whose results in the palato-plastic field have been a great advance over those previously attained. The fact that so many cases of palatal clefts have been operated upon with such unsatisfactory results in the hands of the average general surgeon has done much to create centers in many of the large cities where surgeons specially trained in this work are achieving excellent cosmetic and functional results.

The etiology of congenital deformities in general and palatal and lip clefts in particular are as obscure as ever, and none of the many theories as to their causation have been satisfactory in their explanation. The fact that many cases of these defects have been traced in the same family makes the influence of heredity an important factor. Breeding undoubtedly plays a part in these deformities as is evidenced by the records of the Eugenics Record Office at Cold Springs Harbor, Long Island, compiled from the records of the United States War Department, obtained as the result of the examinations of males made in 1917 before the World War draft. Cleft palate was found to be more prevalent in certain portions of the country where the families had intermarried and very little new blood had been introduced for generations. The early writers of the last century used to attribute many of the congenital clefts to syphilis, but routine Wassermanns in many of these cases have not shown a high enough percentage of positive evidence of syphilis to consider this factor as etiological. Whatever the etiology is finally determined to be, if ever, it is evident that clefts of the lip and palate are failures in union in the developing embryo rather than an arrest of development, as many have claimed. An examination of the parts show about the same amount of tissue present in the palate and lips of those having this congenital deformity as is present in those having normal palates and lips of the same relative age.

Reliable information as to the frequency of occurrence of clefts of palate and lip is not available. From the statistics reported in the literature, J. S. Davis reports 20,085 deliveries with 24 clefts, which make the frequency of one in 1,200. C. J. Lyons found 5 clefts in 10,000 skulls examined, or approximately one in 2,000. Of course, many of the owners of these 10,000 skulls examined may have had clefts of the lip which would not show in the skulls. The concensus of opinion of several investigators into these statistics seems to be that congenital lip and palate clefts occur in one out of 2,200 births.

The value of surgical intervention in cases of congenital lip and palate defects is, of course, always commensurate with the results obtained. Our aim in intervention is twofold, aesthetic and functional improvement. Aesthetically, we have to improve the appearance of the child to as near the normal as possible, which consists of repairing the premaxillary alveolar ridge, the lip and nose and anterior nares. Our functional aim is to correct or improve the speech, aid deglutition and improve the general health of the patient. Most patients with uncorrected palatal defects

have great difficulty in taking their proper places in society because of the speech defect, making them appear backward in school, developing a self-consciousness and later an inferiority complex. These patients usually develop chronic upper respiratory infections with hypertrophic lymphoid tissue in the nasopharynx, making the individual quite subject to secondary systemic toxemia.

The question of age and sequences of operations is a much mooted question and does not seem clearly understood by the rank and file of the profession. Brophy, in his book on cleft palate and lip and in his many monographs on the subject, has striven hard to lay down definite principles as to time and sequence of operation. His vast experience in palato-plastic surgery, covering a period of over forty-five years, has lead him to advocate early operation. The stages or sequence of operation is, of course, governed by the deformity presenting. Where the cleft of the palate is complete, involving the premaxilla and hard and soft palate, our first step is to close the premaxillary portions of the cleft to restore a normal dental arch, to render the parts normal in contour and to support the lip and nose in their normal positions. The best time to do the premaxillary operation is between the first and third months when these parts are in their most plastic condition with comparatively slight calcification of the bones. Delay in this stage of the procedure renders the patient subject to more shock because of the force necessary to replace the bones. The repair of the soft palate should not be undertaken sooner than twelve months after birth. The ideal time for this stage of the operation is generally between eighteen and twenty-four months of age. At this time the tissue is fairly well developed so that the stitches will hold to better advantage, and also the child has not as yet learned to talk. We frequently see patients presented at the clinics that have had the soft palate operated on in the first few months of life and these cases have usually resulted in either complete failure or only partial closure. Each operative failure makes subsequent operations more difficult because of the cicatrix created and the shortening of the palate which results.

Clefts of the lip, where they exist by themselves, should be operated on as soon as the patient is in condition to stand the shock of operation. This is, generally, anywhere between three weeks and three months of age. The advantage of early operation on the lip is that the child is able to take its feedings better and its appearance is less disturbing to the parents and relatives. Where the cleft of lip has accompanied clefts of the premaxillary bones the lip should be operated on a few weeks after the bones have been replaced or at the same time, if both operations can be done within a reasonably short time so as not to add too great an operative shock to the infant. Statistics from many clinics have shown that there is a greater shock attending the repair of the lip than of the palate.

In palatal and labial plastic operations on infants we have two conditions to bear in mind at all times. The first is the purely medical aspect of the case which is the attention to the feeding and nutrition of the patient, rendering them in fit condition for operation and repair of the tissue involved. The second is the surgical aspect of the case in which the operation and technique is carried out. Considering that the physical aspect of the patient is of prime importance, the close cooperation of the surgeon and pediatrician is essential in obtaining the most satisfactory results. The skilled pediatrician should have charge of the patient from birth to the completion of the operative care. At the Presbyterian Hospital in New York where we do a great many operations on infants for the repair of lip and palate defects, the pediatricians supervise the feeding and general physical condition of the patients. Care is observed to take the daily weight of the infants, observe cardiac and renal

functions, and to note particularly any enlargement of the thymus gland. Where enlarged thymus exists, roentgen-ray therapy should be carried out to reduce the gland in size and render the child less liable to status lymphaticus at operation.

Before we consider the actual operative technique let me emphasize the fact that these children tolerate ether vapor as an anesthetic very well. This should be given by an electric vaporizer, either through a single catheter introduced into the normal nostril or given by means of a metal mouth hook. An aspirator is indispensable for removing the blood from the mouth and throat to reduce the amount swallowed or inspired and should always be on hand during operation. Removing the blood in this manner obviates frequent sponging by the assistant and cuts down the operative time which is so important in these cases.

The operative procedure presents a triple problem in complete clefts of the palate and lip, those of the premaxillary bones, the lip and nasal deformity, and the soft palate tissue. The technique is the same in each case if all three are present in the same patient or if only one of the three problems is present. Premaxillary clefts are closed by dissecting the soft tissue over the free edges of the clefts on either side to expose the bone. A wire is passed through the maxilla above the alveolus on each side, passing each end through the bone from the palatal side to the labial surface. The bones are then moulded towards each other by pressure of the thumb on the labial side of the premaxilla, supported on the palatal side by one or two fingers of the opposite hand. When the bones are brought in apposition to each other the free ends of the wire on the labial surface are twisted together to retain the two exposed bony surfaces in apposition. The soft tissue is then sutured together with interrupted sutures of dermal silk or horse-hair. The wire used for the above procedure is either 14 gauge pure silver wire or an annealed copper wire. The wire is retained in place from four to six weeks before it is removed. The method of bringing the maxillary bones together, after the method so aptly described by Brophy in his many contributions to surgical literature, is used by many plastic surgeons with good results, but it is not considered necessary to a perfect closure of the palate in the average case. We have found not only that this operation, while a help in later closing the soft palate, is not only unnecessary but that the resulting narrowing of the maxillary arch has some disadvantages and frequently makes orthodontic procedures obligatory to get good occlusion of the teeth when the permanent teeth erupt. In checking over a large number of postoperative cases of complete clefts of the palate over a period of years in the surgical follow-up clinic at The Presbyterian Hospital in New York, we have failed to find that there was any disadvantage in only bringing the premaxillary bones together and uniting the soft parts when uniting the maxillary bones of the hard palate. The functional results have warranted our following the above procedure in clefts of the bony palate.

Where a bipartite cleft exists, great care should be taken not to sacrifice the protruding premaxilla as has been practiced by some. It is absolutely necessary to retain and replace in its normal position this portion of the bony arch for the reason that it acts as the base of the lip and nose. Where this premaxillary portion protrudes very markedly, it can be replaced by taking a small v-shaped section out of the lower border of the vomer and pushing it back into the space between the lateral portions of the maxilla. Retaining it in place is accomplished by carrying a wire through the lateral portions of the maxilla as described in single clefts; then one end of the wire is carried between soft tissue and the bone of the premaxilla, and the ends of the wire are twisted and the free ends bent in such a position that they do not cause any irritation.

Where they exist clefts of the lip should be closed as the next procedure. There have been many operations devised for lip closure. All of them have some merit and many can be used in particular cases. The incision which we have found to be almost universally adaptable to the average case is the modification of the Thompson operation as described by Dr. New of the Mayo clinics. This operation conserves the greatest amount of labial tissue and gives sufficient length and fulness to the lip. An incision made on the under surface of the lip horizontally on each side of the soft tissue is separated from the facial side of the maxilla for at least an inch in either direction by blunt dissection. With a pair of calipers we measure from the lower junction of the nares and lip to a point which we may determine as the length of the lip. This distance is laid off on each side of the lip from the upper pole of the cleft to a point on the lip at the junction of the vermilion border of the mucosa and the skin. An incision is made with a thin bladed scalpel or bistuary through the whole thickness of the lip on each side. A ligature on a curved needle passed through the freed upper pole of the incised portion allows this to be pulled downward. Coaptation of the lip is started by an interrupted suture which is carried through the external portion of the lip at the junction of the cut with the vermilion border. This fixes the upper vermilion edge of the lip on a straight line. The next suture is passed through the base of the nares and unites the upper portion of the cleft and fixes the outlet of the nares. The remaining portion of the skin coaptation is accomplished with mattress sutures to evert the edges of the skin. The lower border of the lip is trimmed and coapted so that there is a slight excess of the lower border, sufficient to allow for contraction. The tension of the sutures is relieved by the use of the Logan lip traction bow adjusted on each side by adhesive strips.

The operation usually employed in closure of the soft tissue in palatal clefts is a modification of the Langenbeck operation. Occasionally we encounter a case where either the cleft has not been operated on until the child has reached adolescence or several operations have failed, leaving a very wide cleft. In these types of cases we have to resort to a scissor flap operation similar to that done by Sir Arbuthnot Lane.

In doing the mucoperiosteal operation we have found it to advantage to make an incision slightly to the palatal side of the alveolar ridge, and with periosteal separators introduced through these incisions separate the overlying soft tissue to much better advantage than where the separation is attempted from above the free edges of the cleft. Care should be used in the separation in the region of the posterior palatine foramen so as not to cut the circulation at that point. In many wide clefts it is of advantage to extend the lateral incisions around the maxillary tuberosities, extending them posteriorly along the reflection of the mucosa from the cheek to the alveolus. The muscular attachment to the hamular process is separated, allowing a free movement of the posterior portion of the soft palate. With small tenaculum hooks the free edge of the tissue along the cleft is lifted up and a horizontal incision is made along the superior portion in order to roll out the edge and so gain additional tissue to give a broad surface for coaptation. The same is done by splitting the mucosa along the uvula to its tip. The coaptation of the soft tissue is done by the use of mattress sutures which turn out the lower edge and bring the greatest amount of tissue into apposition. For the relief of tension on the soft palate, we introduce two heavy silkworm sutures passing from the external surface of the soft palate above the velum and tied over two lead plates having perforations through which these sutures are passed. These silkworm sutures not only

take the tension off the coaptation stitches but they act as a splint to prevent the action of the tongue from doing too much damage by its pressure.

In the postoperative care of these cases too much emphasis cannot be given to keeping the child quiet and preventing crying. We restrain the child's hands by putting cuffs over the elbows, thereby giving the child the use of the arms, but preventing the child from getting its fingers in its mouth. In young infants that show the slightest shock from operation, 5 per cent glucose is given by clysis or by rectum. We feel milk should be eliminated from the diet of all postoperative palate cases for at least forty-eight hours after operation because of the irritation of the lactic acid fermentation. The coaptation sutures in soft palate operations should not be left in too long. It is often well to start removing some of the sutures after the fourth day.

CONCLUSIONS

It is most important to do the various stages of these operations in their logical sequence and at the proper time. The thorough freeing of palatal tissue from the bone so that there is practically no tension in coaptation is essential. Too much emphasis cannot be given the postoperative handling of these cases. Lastly, the utmost care should be observed that the child is in as good physical condition as possible and free from upper respiratory infections before operation.

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PERIRENAL AND INTRARENAL LIPOMA*

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INTRARENAL lipoma and perirenal lipoma are not especially rare. Lipoma is sometimes observed in the kidney at necropsy and occasionally, when it becomes large or invades the renal pelvis, produces symptoms which call for surgical treatment. Perirenal lipoma, on the other hand, although less common is more likely to be of surgical significance because of its tendency to grow to a large size, and hence to cause clinical symptoms. In the Mayo Clinic operation has been performed in one case each of intrarenal lipoma and perirenal lipoma, and intrarenal lipomas of smaller size have been observed at necropsy.

True tumors of adipose tissue in and about the kidney may be classified as (1) perirenal lipoma, including the diffuse and circumscribed types, and (2) intrarenal lipoma, including the cortical, subcortical and pelvic types.

PERIRENAL LIPOMA

In Rayer's Atlas, published in 1837, are some remarkable pictures of a kidney surrounded by an immense amount of adipose tissue, apparently arising from the perirenal capsule. Rokitanski, in 1842, discussed hypertrophy of the fatty capsule of the kidney and drew attention to the fact that it may occur independent of, or concurrent with, general adiposity, and that at times the hypertrophy may be so marked that the fat penetrates into the hilum, near the pelvis and calices, and diminishes the blood supply to such an extent that renal atrophy results.

LeCrampe-Loustau, in 1881, reported a case of perirenal lipoma and reviewed the early literature in which he noted three cases. He concluded that these tumors usually do not produce symptoms and are therefore practically never diagnosed clinically; even if a tumor is diagnosed, perirenal lipoma cannot be distinguished from other tumors occurring in the same situation. He also noted that, except in rare instances, perirenal lipoma is associated with renal calculi, which he thought might have some etiologic relationship.

Since then there have been isolated case reports, of which Samuels' is the most notable. The patient, a woman, aged forty-six, had suffered from pain in the left side for two years; at times it was severe and associated with vomiting. A smooth tumor was palpated in the left side of the abdomen. The urine was normal; cystoscopic examination demonstrated deficient secretion from the left ureter. At operation the kidney was normal; there was an encapsulated tumor in the perirenal tissue which proved to be a fibrolipoma.

The first case of perirenal lipoma observed at the Mayo Clinic was of the diffuse type.

CASE 1.* The patient was a married woman, aged forty-nine. Since the birth of her first child, twenty-six years previously, she had been weak and was easily fatigued. For five years there had been attacks of moderately severe pain in the left side of the abdomen, accompanied by diarrhea, vomiting and fever. These attacks had occurred every three to twelve months and usually confined her to bed for from six to eight days. She had lost 7 pounds in one and a half years. Soon after

*This case was mentioned by Foulds, Scholl, and Braasch. It was the only lipoma in a series of 283 renal tumors removed surgically at the Mayo Clinic between 1901 and 1921.

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the onset of these symptoms a tumor was discovered in the left side of the abdomen.

The patient was moderately well nourished. The tumor in the left side of the abdomen was large and firm. The hemoglobin was 60 per cent; the Wassermann test on the blood was negative; the urine contained a trace of albumin and an occasional erythrocyte and pus cell. At operation a huge fatty tumor was found in the left renal area. The tumor and the kidney were removed transperitoneally. Convalescence was uneventful and four years after operation the patient had gained 30 pounds and was in excellent health.

Grossly the specimen consisted of a huge mass of fat, 20 cm. in diameter, entirely surrounding the kidney. There was no definite capsule, although the tumor did not show evidence of invasion of the surrounding structures. Grossly the kidney appeared normal, and microscopically there was an occasional partially or completely fibrosed glomerulus. The tumor was composed of adipose tissue with many small islands of connective tissue, each surrounding a vascular channel. Perirenal fibrolipoma was diagnosed.

Diagnosis. There is no definite dividing line between simple hypertrophy of the fatty capsule of the kidney and perirenal lipoma. However, as the growth attains a size two or three times that of the normal, especially if unilateral, it passes beyond the stage of simple hypertrophy and must be classified as tumor. Hypertrophy is usually bilateral and associated with generalized obesity, while perirenal lipoma is usually unilateral and frequently occurs in normal or even undernourished and emaciated persons.

Circumscribed lipoma in the perirenal tissues, such as the one described by Samuels, is easily distinguished from simple hypertrophy but is extremely rare.

The kidney in these cases may be unchanged or may undergo atrophy, probably due, as Rokitanski suggested, to the penetration of fat into the hilum, diminishing the blood supply to such an extent that atrophy results.

It is with this type also, as was pointed out by LeCrampe-Loustau, that renal calculi are sometimes associated. For this reason Albarran considered them inflammatory enlargements rather than true tumors. However, in no other situation does fatty hypertrophy of this type result from inflammatory processes. Moreover, cases such as the one just reported, in which the kidney was practically normal and there was no calculus, are difficult to explain on the basis of inflammation.

The clinical data in cases of perirenal lipoma are not characteristic. All of the patients observed have been more than forty years of age, and there have been more women than men. There is usually mild pain on the side involved, and occasionally there are attacks of severe pain associated with vomiting and symptoms of pressure. The patient may be aware of the presence of a tumor or may be unaware of it until it is discovered on examination. The urine is usually normal, and roentgenologic and cystoscopic data are only of value in eliminating other conditions. Perirenal lipoma may only be suspected in the presence of a palpable tumor in the renal area with negative pyelographic data, or in the presence of renal calculus and a palpable tumor when hydronephrosis can be excluded as the cause of the tumor.

INTRARENAL LIPOMA

The early literature dealing with intrarenal lipoma is somewhat confused because a distinction was not made between true lipoma and other types of renal tumor with a high fat content but no true adipose tissue. Grawitz, in 1883, recognized the existence of true renal lipoma which he believed to be rare, and distinguished it from the larger group of renal neoplasms of high fat content but which microscopically simulate adrenal tissue. To the tumors of the latter group he applied the name hypernephroma.

LaCrampe-Loustau included in his review four cases of intrarenal lipoma, and Weber, Barlow, Manasse, and others have

described lipoma, fibrolipoma, lipomyxoma and lipomyoma of the kidney. The majority of these, however, have been small tumors not producing clinical symptoms. Recently Lower and Belcher reported a case of massive renal lipoma which was removed surgically. They reviewed the literature and noted five other instances in which renal lipoma had attained large dimensions. In four of the six cases in their review the tumor had been removed surgically, and in two it had been discovered at necropsy. The case observed at the Mayo Clinic is the fifth case on record of a renal lipoma removed surgically.

Fig. 1. (Case II) Intrarenal lipoma. The lower calix is slightly dilated and the minor calix elongated. The density of the shadows of the lower major and minor calices is less than that of the remainder of the pelvis.

Case II. The patient was a single woman, aged twenty-eight. Appendectomy and partial oophorectomy had been performed three years previous to examination at the Mayo Clinic. For two years there had been distress in the right lumbar region which was mild at first but for two months had been severe. Hematuria had been present for ten days and was becoming more marked, with urgency and frequency, and burning on urination. She had lost 10 pounds in one month.

The right kidney was easily palpable and slightly tender. The hemoglobin was 59 per cent; the erythrocytes numbered 3,700,000 and the leucocytes 9,000; the urine contained a large amount of albumin, many erythrocytes and an occasional pus cell. The combined intravenous phenolsulphonephthalein test gave a return of 50 per cent in two hours. Roentgenograms of the kidneys, ureters and bladder were negative. Cystoscopic examination showed that the mucosa of the bladder was normal. Bloody urine was seen coming from the right ureteral orifice. Ureteral catheters were passed without difficulty; the differential phenolsulphonephthalein test revealed a delayed return and moderately reduced function of the right kidney. Repeated pyelograms showed a normal outline of the right pelvis and ureter (Fig. 1). The lower calix was slightly dilated and the minor calix was elongated. The shadows of the lower major and minor calices were less dense than the remainder of the pelvis.

Fig. 2. (Case II) Cross section of kidney containing lipoma.

Possible right renal neoplasm was diagnosed and exploration was advised. At operation a tumor, which was about 2.5 cm. in diameter and elevated slightly above the surface, was found on the anterior surface of the right kidney. It was impossible to enucleate the tumor on account of its size and situation; nephrectomy was performed. Recovery was without incident.

Grossly the tumor was a soft yellow mass, extending into and displacing the renal substance down to the pelvis. It was

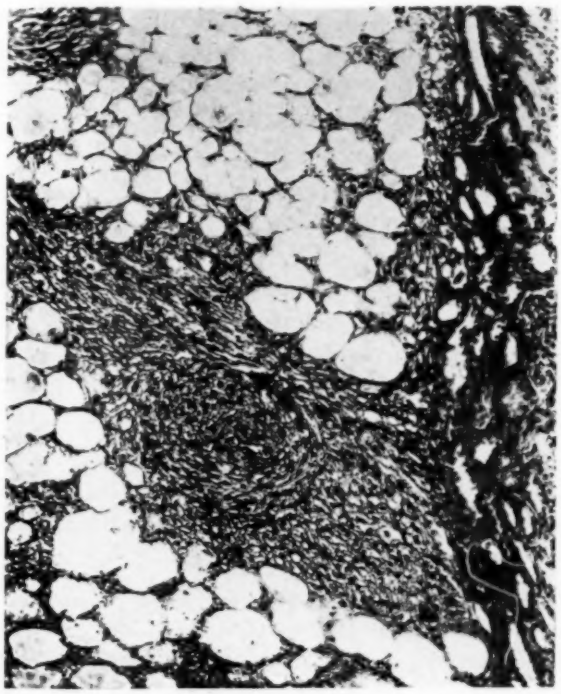

Fig. 3. (Case II) Section at periphery of fibrolipoma of the kidney. The perivascular arrangement of the fibrous elements is shown. (× 70)

not encapsulated but was sharply demarcated from the surrounding tissue (Fig. 2). Microscopically the renal parenchyma removed there was a fine network of spindle-shaped and star-shaped cells with pyknotic nuclei, enclosing small cavities. In sections stained with Sudan III it was seen that these cavities were filled with fat. A large number of vascular channels were present, each surrounded by islands of moderately dense fibrous tissue, which comprised at least a third of the total volume (Fig. 3). An occasional area of myxomatous tissue was present in the denser areas of connective tissue. The tumor was fibrolipoma.

Diagnosis. In cases of intrarenal lipoma clinical symptoms are present only when the tumor is large or when it encroaches on the renal pelvis. According to Lower and Belcher, all the reported cases of large lipoma have been among women, and our case was that of a woman. There is often mild pain in the side involved and a tumor may be palpable. Occasionally hematuria is present. When the tumor is primarily intrapelvic or encroaches on the pelvis secondarily, pyelographic data may establish the diagnosis of renal tumor but the differentiation of lipoma and other types of renal tumor cannot be based on them.

MICROSCOPIC OBSERVATIONS

Microscopically, intrarenal and peri-

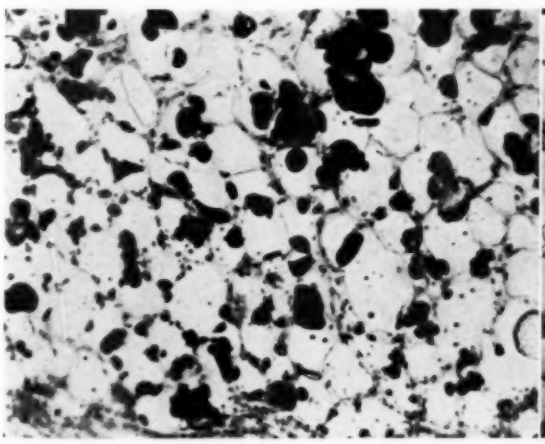

Fig. 4. Typical renal lipoma stained with Sudan III. (× 120)

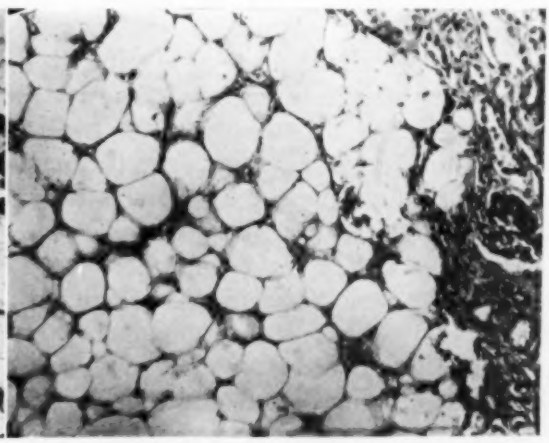

Fig. 5. Typical renal lipoma stained with hematoxylin and eosin. (× 120)

appeared normal; the tissue surrounding the tumor was moderately compressed. In preparations from which the fat had been renal lipomas are found to be composed of typical adipose tissue (Figs. 4 and 5). Frequently, however, in the small tumors,

and usually in the large ones, many irregular islands of connective tissue are present constituting as much as 25 per cent or more of the volume of the tumor. These islands practically always surround a vascular channel of relatively large caliber, and it is quite probable that they arise from the perivascular connective tissue. In fibrolipoma it is not unusual to find areas of myxomatous tissue. Smooth muscle in combination with adipose tissue was observed by Manasse and others. Sarcomatous change in the large tumors has been reported in several instances by Albarran, and others.

ETIOLOGY

In general lipoma arises in situations in which adipose tissue is normally present. In perirenal lipoma the tissue of origin is self-evident but with intrarenal lipoma, at least with the cortical and subcortical types, this is not the case, inasmuch as normally there is no fat present in the renal parenchyma. Virchow, alluding to this fact, referred to such tumors as heteroplastic lipoma, and Ewing called attention to their similarity in this respect to lipoma in the liver and lungs. We are forced, therefore, just as in the case of many other types of renal tumor, to speculate more or less regarding their origin.

Alsberg believed intrarenal lipoma had its origin in small islands of embryonal tissue which remained as rests during the development of the kidney. It is more generally believed to arise from multiplication of the perivascular and intertubular connective-tissue cells which undergo fatty metamorphosis, and this view is well supported by the relative frequency of fibrolipoma in which the fibrous elements have a typically perivascular arrangement. The occurrence of lipomyoma in the kidney can also be explained in a similar manner, the muscular element arising from the muscle tissue of the vessel walls. Myxomatous tissue when present is often limited to the areas of dense fibrous tissue and is an indication of active growth of the latter.

It is also possible that the cortical and subcortical tumors may originate from the renal pelvis or the juncture of the medulla and cortex and push their way outward along the path of least resistance to assume a cortical position. The occurrence of subcortical tumors and such tumors as the one in Case II, which extended from well within the kidney to, and protruding above, its surface, lends support to this theory.

DISCUSSION

Not uncommonly lipoma is noted in the kidney or other regions in cases in which there has been loss of weight or even marked emaciation from some other cause. This phenomenon was noted in several cases at the Mayo Clinic in which renal lipoma was observed at necropy and also in several of the cases in the literature. The tumor, however, showed no evidence of diminution in size. Wells, studying the fat metabolism of lipoma, stated that tumor cells not only build up their own cellular structure of proteins which are inaccessible to the rest of the wasting body, but also accumulate and withhold fat which appears to resemble the normal stored foods in all respects. There is no anatomic pecularity known, he stated, that can explain such anomalous deportment. A chemical difference between the fat of the lipoma and the fat of the normal fat deposits might explain this unavailability of the former, but no such difference, at least of sufficient magnitude to be revealed by existing chemical methods, has been found. Since the storage of fat by the tissues depends on the presence in these tissues of the enzyme lipase, which acts reversibly either to split or to synthesize fats, he suggested that there might be a deficiency or abnormality of this enzyme in the connective tissue of lipoma. The results of his experiments, however, failed to show any qualitative difference between lipoma tissue and normal fat tissue to hydrolyze various fats and fatty esters. No reliable method could be devised to test for qualitative differences.

SUMMARY

Intrarenal lipoma and perirenal lipoma present many features of interest. The total number of cases reported is small and of all benign renal neoplasms only myoma and angioma occur less frequently. They occur in a great variety of positions and types in and around the kidney. The occurrence of lipoma in the renal parenchyma is difficult to explain because there is normally no adipose tissue present in this situation.

Although intrarenal lipoma and perirenal lipoma are usually not diagnosed clinically, cases are recorded in which the associated clinical symptoms have led to surgical removal of the growth. In cases of perirenal lipoma the outstanding symptom is pain and the presence of a tumor is evident. Urinary disturbances are absent unless there is an associated renal lesion such as calculus. In cases of intrarenal lipoma, symptoms usually depend on involvement of the renal pelvis which occurs when the tumor enlarges or when it is primarily situated in the pelvis. Roentgenographic data aid in the diagnosis only in so far as they furnish evidence of the presence of a tumor; lipoma cannot be distinguished from other renal neoplasms by such means.

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THE ROENTGEN-RAY DIAGNOSIS OF DIVERTICULOSIS, CARCINOMA AND OTHER NEW GROWTHS OF THE COLON*

W. B. Bowman, M.D. and Ray A. Carter, M.D.

LOS ANGELES

THE positive early diagnosis of diverticulosis or of carcinoma or other new growths of the colon is possible in most cases by a complete roentgen-ray examination of the colon long before the clinical evidence is sufficient to demand surgical intervention. This paper is a plea for the early roentgen-ray examination of cases presenting vague colon symptoms, particularly when they have reached the age when malignancy may be suspected.

DIVERTICULOSIS

Diverticulosis is a condition which occurs more often in men than in women and more commonly in slightly obese than in thin patients. The diverticula vary in size from that of a small pea to the size of an egg, and are more often seen in the descending colon, although diverticula of the transverse and ascending colon are by no means uncommon. A diverticulum represents a hernia of the mucosa through the musculature of the colon, and histologically is made up of serosa, submucosa and mucosa, the muscularis usually being missing.

Peridiverticulitis, an inflammation with round cell infiltration usually resulting in a mass formation, is the factor with which we are most concerned because it may be mistaken for a new growth. The roentgen-ray differential diagnosis depends upon the visualization of the barium-filled diverticula which must be differentiated from (1) phleboliths; (2) partially calcified glands; (3) renal or ureteral calculi; (4) barium retained in contracted haustra; (5) carcinoma of the colon. The first three can be ruled out by manipulation during fluoroscopic examination. The fourth can be differentiated by the change on position of the haustral collection, while the diverticula remain constant.

The fact that diverticulitis is often accompanied by defects in the filling of the colon and by the presence of palpable masses makes it difficult but essential to differentiate it from carcinoma or malignant growths of the colon.

CARCINOMA AND NEW GROWTHS

The early recognition of malignant growths of the colon is of the utmost importance so that surgical interference may be resorted to immediately, for no other treatment is of any use. While the roentgen-ray findings are not infallible, still in this method of examination of the colon we have the earliest and most reliable method of recognition of this class of tumors.

The cardinal roentgenogram signs of carcinoma of the colon are (1) filling defects; (2) partial or complete obstruction with or without dilatation of the colon proximal to the obstruction; (3) coincidence of mass with filling defect.

The filling defect, which is the most constant and the most important finding, is an irregularity in the outline of the colon produced by the infiltration of the walls

* Read before the Los Angeles Surgical Society.

and the projection of the irregular mass into the lumen of the colon. This defect is present at all examinations and will not disappear on administration of belladonna or on massage.

Partial or complete obstruction is of great importance as non-malignant strictures are rather rare. It is sometimes caused by the valve-like action of tumors, and it may be noted that there is marked obstruction to the entrance of an opaque enema in cases in which there is little if any delay in the evacuation of the opaque meal.

Hence, it is readily seen that the administration of an opaque enema under fluoroscopic control is most essential.

Filling defects are not necessarily caused by malignant growths but may be caused by (1) gas; (2) retained fecal material; (3) pressure from without, such as from tumors without the colon, or from the spine or brim of the pelvis; (4) adhesions or adhesive bands; (5) spasm; (6) diverticulitis; (7) tuberculous ulceration of the colon; (8) gumma; (9) inflammatory mass around the cecum following appendiceal abscess.

Gas, spasm, pressure from without the colon, tuberculous ulceration and inflammatory mass from appendicitis can usually be ruled out by manual manipulation at the time of visualization. Proper preparation will rule out retained fecal material. Visualization of diverticula will assist in the diagnosis of diverticulitis. History and blood examination will, as a rule, differentiate from gumma. Lack of infiltration of the walls and absence of tumor mass will assist in differentiating between adhesions and malignancy.

Again, for the patient's sake, we wish to urge that the physicians who first see cases of this type have the patients examined promptly by the roentgenologist instead of waiting until there is palpable mass or other obvious finding. In this way we feel that an earlier diagnosis can be made which will, of course, result in earlier surgical interference and a resultant decrease in the mortality of this type of malignancy.

FRACTURE OF THE OLECRANON*

W. Russel MacAusland, M.D.

BOSTON

From an observation of the end results of many fractures of the olecranon treated by conservative methods, I have come to believe that by far the greater proportion of these lesions can be treated more satisfactorily by open operation. Conservative treatment often necessitates a long period of convalescence which may be obviated by operative procedure. Many cases treated by the well-known method of retention of the arm in extension do not obtain a good functional result, particularly as to extension. Surgical interference assures good motion and safeguards the power of extension. In dealing with a bone so near the surface as the olecranon there is little operative risk.

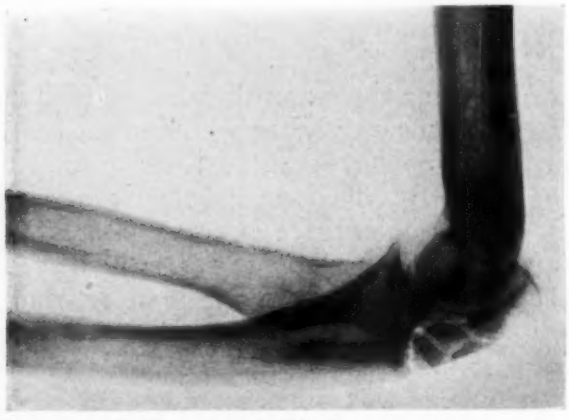

Fig. 1. J. C. Fracture of the olecranon showing elongation and consequent limitation of extension.

TYPES OF FRACTURES

Fractures of the olecranon are of three different types: the transverse fracture, the comminuted, and the open. The transverse type is the most common, and the comminuted and open fractures are seen only occasionally.

In discussing the advantages of open operation in the treatment of fractures of the olecranon, we are concerned mainly with the transverse and comminuted types. In open fractures, in which joint sepsis may occur, operation is out of the question unless the patient is seen very early. As a rule, the result in such cases is ankylosis, for which, after a period of one and one-half to two years, arthroplasty may be performed with the expectation of restoring good function to the joint.

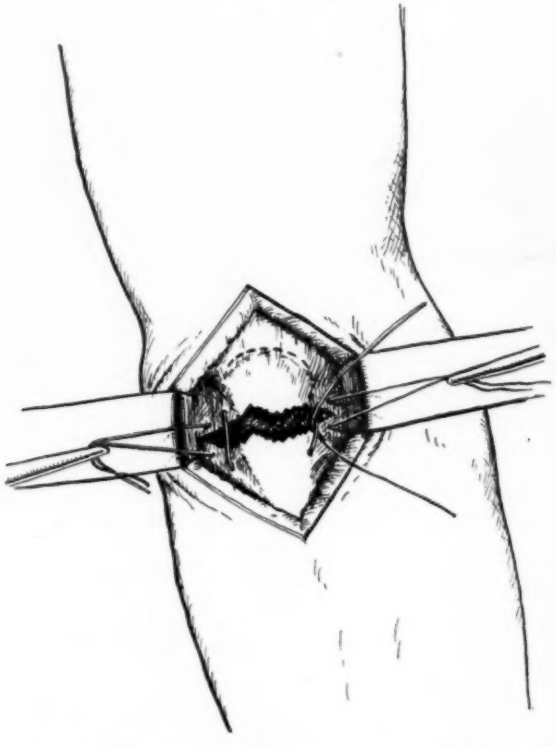

Fig. 2. Suture of fractured olecranon, right arm. Author's technique.

The transverse type is usually due to direct violence. The fracture enters the elbow joint, which becomes filled with blood.

Both the transverse and comminuted fractures may be closed or they may be complicated by displacement of the fragments. The extent of the separation is determined by the severity of the lateral

* From the MacAusland Orthopedic Clinics.

tear of the triceps insertion overlying the seat of fracture. In severe cases the separation may amount to one-half inch or more. In cases of wide displacement, a sulcus frequently is found between the tip and the body of the olecranon.

ETIOLOGY

The majority of fractures of the olecranon are due to direct violence, a fall upon the elbow being the most frequent cause. In 70 out of 138 fractures of the olecranon reported by Eliason,* the cause was a fall upon the elbow. In some cases the break is due to indirect violence, such as contraction of the triceps tendon. When caused by muscle pull, the fracture occurs at the tip of the olecranon in the region of the epiphyseal line; it does not extend completely through the joint but represents a small piece of cortical bone torn off at the triceps insertion. Still other fractures may be due to a combination of direct and indirect violence.

Fractures of the olecranon are more common in adults than in children, and men are affected more frequently than women.

Fig. 3. J. C. End result. Suture of olecranon.

SYMPTOMS

The common symptoms are pain in the elbow, swelling, tenderness, crepitus, inability to extend the forearm forcibly, and effusion into the elbow joint. Ecchymosis almost invariably is seen within twenty-four hours of the accident. The arm is usually held slightly flexed.

DIAGNOSIS

The diagnosis is readily made from the history of the injury, the symptoms of pain, swelling, local tenderness, crepitus, loss of the use of the lower arm, a false point of motion, and from the presence of a sulcus in the olecranon. Roentgenographic examination will corroborate the clinical findings. In making a roentgenographic diagnosis in young patients, Roberts and Kelly* warn against mistaking a partially ossified process of a normal epiphyseal line of a fracture line. Speed† believes that in fresh injuries there is sufficient ground for the diagnosis of fracture, if the power of active extension is diminished and if there is swelling and a persistent point of tenderness when the process is examined by digital or pencil-end pressure.

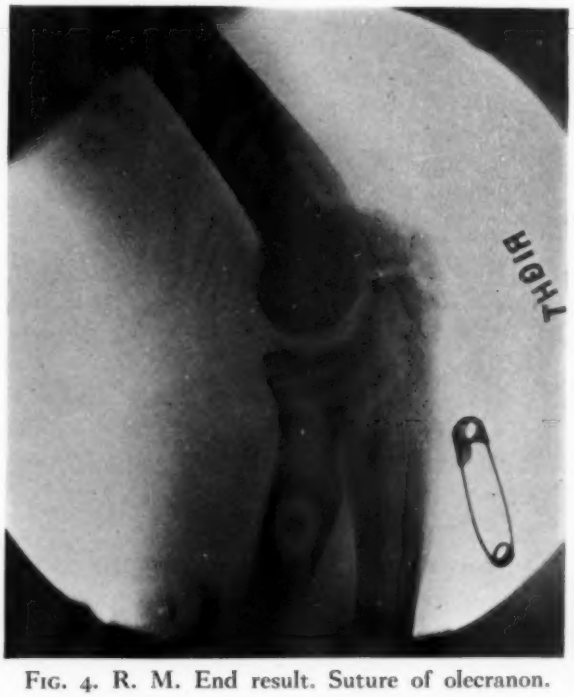

Fig. 4. R. M. End result. Suture of olecranon.

Fractures of the olecranon must be differentiated from fractures of the lower

*Eliason. Fractures of the Humerus, Radius and Ulna. New York, 1925.

*Roberts and Kelly. Treatise on Fractures. Phila. Ed. 2., 1921.

†Speed. A Textbook of Fractures and Dislocation. Phila., 1916.

end of the humerus and backward dislocation of the elbow.

PROGNOSIS

The prognosis in simple transverse and comminuted fractures without displacement treated conservatively is good. In many cases, however, the power of flexion returns very slowly. If treated by operative methods, the majority of these simple transverse or comminuted fractures recover motion more fully and in a shorter period of time.

The prognosis in fractures with wide displacement, in particular comminuted fractures with separation of the fragments, when treated conservatively, is less favorable. Flexion is somewhat limited and extension is never complete. The final limitation in extension is proportionate to the extent of the displacement of the fragments. The following case illustrates the result commonly obtained in a case of comminuted fracture with displacement treated conservatively.

Case 1. J. C. This patient fell and injured his elbow, sustaining a comminuted fracture of the olecranon with about one-half inch separation. His physician was advised to operate, but did not do so. The arm was put in plaster at a right angle. Eight months after the accident, there was still 45 degrees limitation in extension. (Fig. 1.)

Fig. 5. L. M. End result. Suture of olecranon.

When fractures with displacement are treated by operation, the recovery of full extension and flexion is assured.

TREATMENT

In the treatment of fractures of the olecranon, a perfect anatomical reposition of the fragments is essential to success. Only when the fragments are properly approximated does solid bony union take place. In fractures not properly approximated, a fibrous union occurs which causes limitation of motion.

While it is possible under conservative treatment to obtain good solid union in simple transverse fractures and in some comminuted types with moderate displacement of the fragments, the convalescence under such treatment is so slow that weeks or even months may elapse before function is complete. The recovery of normal flexion in particular is slow. This prolonged convalescence is due to the fact that the olecranon, like the patella, is a bone which unites very slowly. Long immobilization is required to obtain perfect union. Frequently gentle manipulations under an anesthetic are necessary.

Inasmuch as operative interference in these cases would materially shorten the period of convalescence and at the same time ensure a solid bony union, I believe that the majority of such lesions should be treated surgically.

In the treatment of fractures with wide placement, perfect anatomical reposition cannot be established by the conventional method of treatment. Hence, a fibrous and not a solid bony union is obtained in cases which have not been properly approximated, or in which a superficial suppuration has existed, or in comminuted fractures in which a fragment has become lost. The degree of solidity varies according to the amount of separation of the fragments. The flexion in these cases may be affected only slightly, but the extension is limited in proportion to the extent of the displacement of the fragments. Movement is further limited by the formation of excessive callus which usually develops around comminutions in cases of malposition, comminution, and unapproximated fragments.

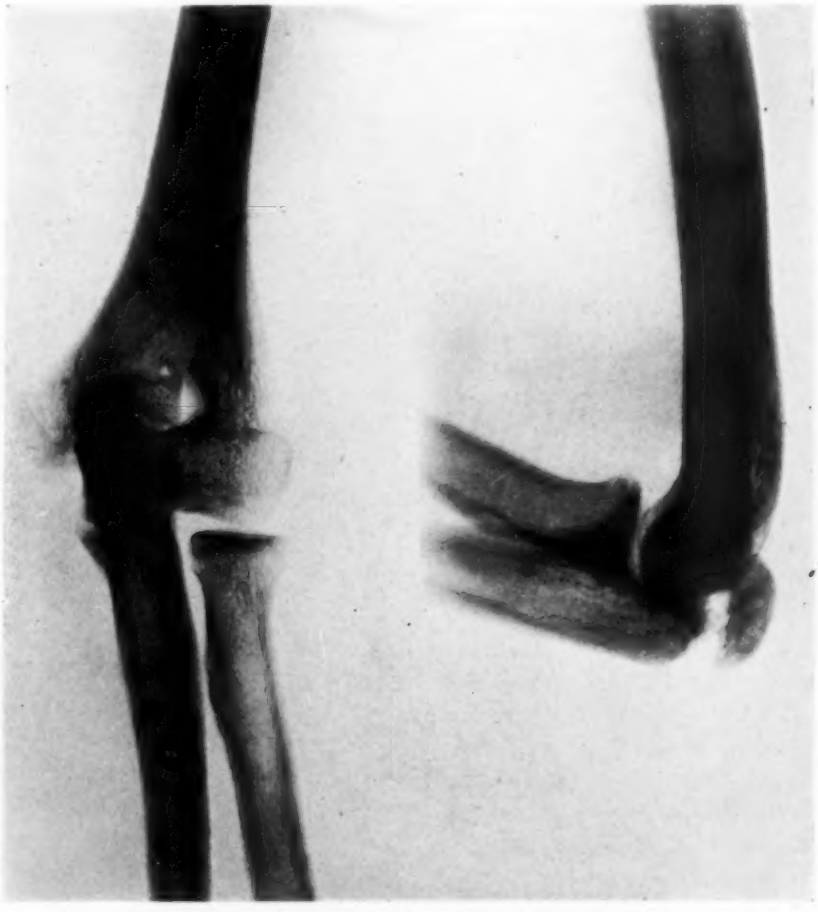

Fig. 6. W. F. Fracture of olecranon. Before operation.

Fractures with wide displacement, partic-

ularly comminuted fractures with displacement, are treated most satisfactorily by open operation. Perfect anatomical reposition can be established by operative interference, and a good bony union will result. The restoration of complete function is assured.

In cases in which fibrous union has occurred, the treatment depends upon the degree of solidity of the union and upon the time at which the case is seen.

Fig. 7. W. F. End result after suture of olecranon.

When the fibrous union is weak, excision of the tissue and suture of the fragments is always indicated. Otherwise, the arm will always be weak.

In early cases of fibrous union, removal of the fibrous tissues and approximation of the fragments is always to be considered with the view of providing the arm with function and strength for later life.

In old-standing fibrous cases, operation is indicated only if function will be improved by the use of this measure. Operation in such cases is not entirely satisfactory, and if the existing function is adequate, a firm fibrous union is to be preferred to subjecting the patient to a surgical risk.

The indications for operation, as set forth above, may be summarized as follows:

Surgical interference is indicated in (1) simple fracture with wide separation, (2) comminuted fracture with separation and spread, (3) cases in which early function is of importance, and (4) late cases in which function can be improved. Swelling is an indication rather than a contraindication for immediate operation in recent cases.

AUTHOR'S TECHNIQUE

The operation is done under a tourniquet (Fig. 2). Following the usual two-day preparation, a curved longitudinal incision is made over the body of the olecranon near the attachment of the triceps tendon. The skin and fascia are dissected laterally to give proper exposure. If there is any displacement, the fracture cavity is carefully wiped out without disturbing the fragments, and any small spicules of bone which would interfere with a perfect anatomical reduction and all blood clots are removed. A lateral drill hole is then made through the body of the olecranon, and at the point of attachment of the triceps tendon the fragments are brought into absolute approximation and retained by chromic suture. After such a reduction, the reposition is perfect and only a crack is seen in the surface of the ulna. The periosteum at the line of fracture is sutured. Any tear in the lateral capsule or triceps tendon expansion which may have been ruptured at the time of the accident, is likewise sutured. The arm is then allowed to flex to the point of suture tension. The amount of flexion obtained, when the operation is carried out early and carefully, is often beyond a right angle. No effort should be made to force the arm

into acute flexion, but the weight of the limb itself should be the deciding factor in determining the amount of flexion obtainable with the given suture in place. The skin is closed with continuous catgut suture, and the arm is maintained in flexion by adhesive strapping and a Velpeau bandage. Surgical convalescence is uneventful. Lateral roentgenograms should be taken within a day or two. It is possible to start passive motion in ten days or two weeks. The motion should never be forced but should be very gentle and cause no pain.

Some surgeons recommend the use of wire sutures, but in the opinion of the writer, these are to be discouraged because of the danger of infection. When metal is in contact with bone, suppuration often develops late, as is seen when bullets are lodged in bone. Absorbable sutures are as efficient as wire and less dangerous. If chromic catgut sutures are used, they will last for three or four weeks, and at the end of that time, firm fibrous union will have taken place and there will be the beginning of a bony union.

Washing the joint, a process advocated by some surgeons, is to be discouraged, for it involves an unnecessary risk of infection.

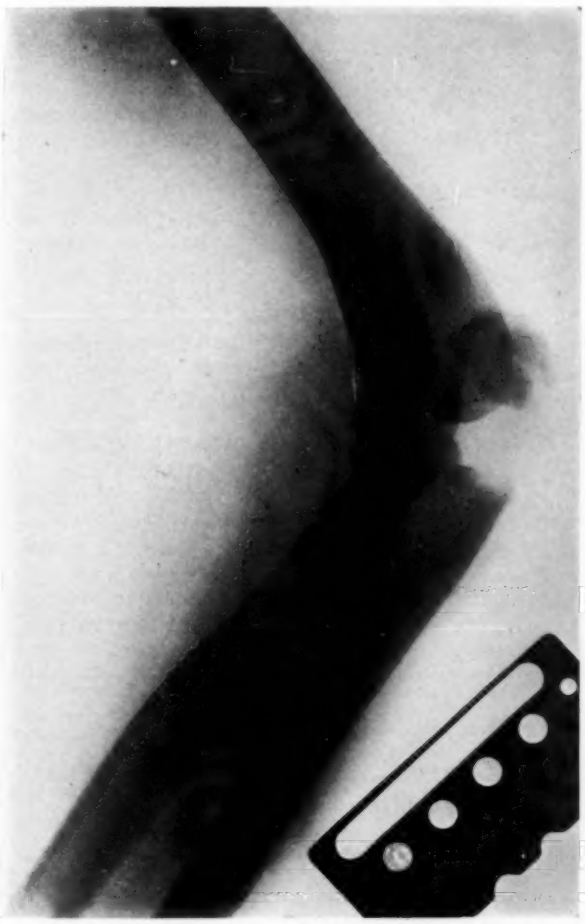

Fig. 8. F. S. Before operation. Fracture of olecranon.

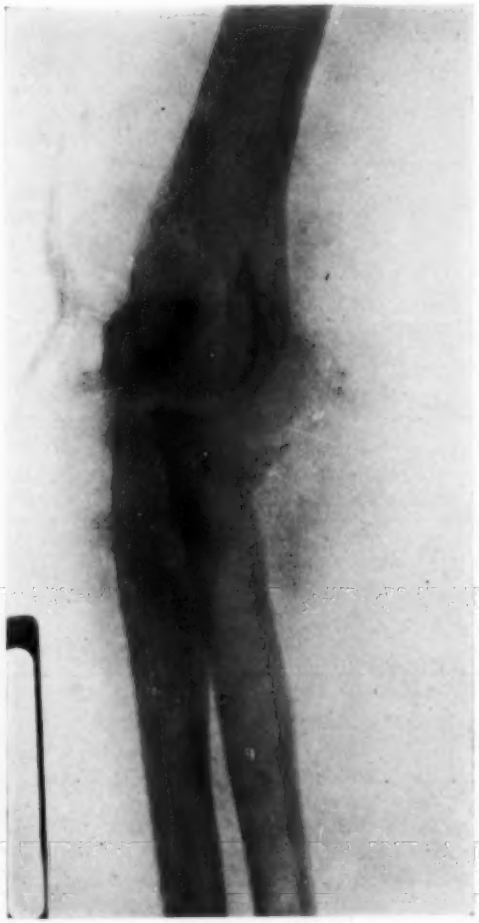

Fig. 9. F. S. End result. Suture of olecranon.

The use of metallic plates also is contraindicated, as the introduction of foreign material in a joint fracture delays normal union and involves danger of sepsis.

Suture of the fibroperiosteum and the triceps fascia is not sufficient. If open operation is performed, the joint should be properly exposed and the fragments approximated. In addition the lateral expansions of the triceps should be exposed and the transverse tear in these structures repaired.

In gunshot fractures with a loss of bone continuity, a bone graft may be considered after healing has taken place. Fiolle* reported good results following the removal of the olecranon in a case of gunshot fracture.

In ununited fractures of the olecranon process, Albee* uses an inlay graft, which is held in place by kangaroo tendon, a sliding graft, or a tibial graft.

Below, the writer reports a series of cases of fractures of the olecranon treated by suture.

FRACTURES OF THE OLECRANON TREATED BY SUTURE

Case	Age	Type	Time before operation	Time in retentive apparatus	Results
J. C.....	..	Fracture of left olecranon with considerable swelling, ecchymosis, and tenderness.	2 days	3 weeks	In 8 months, rotations and flexion normal. Extension to 160°. Final result perfect. (See Fig. 3.)
R. M.....	16	Fracture of olecranon with ½ in. separation and fracture of external condyle.	4 days	6 weeks	In 6 weeks, extension to 155°. Flexion to 90°. No swelling or tenderness. Final result perfect. (See Fig. 4.)
L. M.....	18	Fracture of right olecranon.	.....	4 weeks	In 8 months, motion 45° to 180°. Final result perfect. (See Fig. 5.)
G. P.....	..	Fracture of right olecranon.	2½ or 3 weeks	5 weeks	About 2 months later, motion within 15° of normal. Final result perfect.
W. F.....	16	Simple.	4 days	7½ weeks	In 3 months, elbow could go within a few degrees of complete extension. Final result perfect. (See Figs. 6 and 7.)

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THE CAUSES AND TREATMENT OF UTERINE BLEEDING

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THE term uterine bleeding is chosen instead of uterine hemorrhage advisedly as the subject of this paper, as the latter is nearly always associated, in the patient's mind, with bleeding of the profuse type. Bleeding is a symptom and not a disease *per se*, and unfortunately it is looked upon rather lightly by the average woman. As a result of this, we see the exsanguinated patient applying for admission to our services, who, in many instances, is in no physical condition to withstand the treatment necessary for the condition etiologically responsible for the symptom. The educational campaign against cancer is gradually bringing patients to us in the earlier stages of uterine bleeding, so that we look to the future for general improvement in the early treatment of uterine hemorrhages, whatever the cause may be.

Generally speaking, uterine bleeding is classified under two heads, physiological and pathological.

PHYSIOLOGICAL UTERINE BLEEDING

Physiological bleeding deals with menstruation. Normal menstruation according to Sutton may be defined as a "periodic discharge of blood from the uterus, accompanied by the shedding of portions of the epithelium of the body and the fundus as well as that lining the utricular glands near their orifices." The menstrual discharge, therefore, contains blood mixed with the glandular secretions and the desquamated surface epithelium of the endometrium.

The internal secretion of the ovary produces the menstrual impulse; the uterus, in responding to this impulse, occasions the menstrual flow. The resulting bloody fluid is dark, thin and slimy; it contains blood corpuscles, mucus, leucocytes, epithelium, and shreds from the stroma. The blood of normal menstruation does not clot as the presence of mucus from the glands of the cervix, and the proper proportion of thrombokinase and thrombolysin from the normal endometrium prevent this. Every woman has her own normal course, and this should be carefully studied to differentiate between the normal and the abnormal.

In this country the average age at which menstruation is established is the fourteenth year, although moderate variations from this are not considered abnormal. Menstruation occurs every twenty-eight days in the average woman, and lasts from three to five days. The period of sexual activity, which begins with puberty and ends with the menopause, lasts from thirty to thirty-five years on an average. Normal menstruation in the same woman may vary with the full attainment of puberty, with the assumption of marital relations and after pregnancy.

PATHOLOGICAL UTERINE BLEEDING

Pathological uterine bleeding occurs in the form of a menorrhagia or a metrorrhagia. Menorrhagia may be defined as prolongation and accentuation of the normal menstrual period, while metrorrhagia is the irregular uterine bleeding which occurs between the periods and obviously suggests more advanced pathology.

Pathological uterine bleeding may be divided into (a) bleeding connected with pregnancy and (b) bleeding not connected with pregnancy.

BLEEDING CONNECTED WITH PREGNANCY

1. *Abortion and Miscarriage.* These may be threatened, imminent or inevitable. Again, they may be complete or incom-

plete. In all cases uterine bleeding is usually the first symptom. In the complete variety the bleeding usually stops after the patient has gone through the lying-in period. Persistent bleeding following an abortion or a miscarriage generally means retained products which should be evacuated. This should be done with as little trauma as possible; gentleness should be the keynote in removing retained products from a pregnant uterus. The incomplete abortion or miscarriage group probably accounts for the large percentage of uterine bleeding associated with pregnancy.

2. *Ectopic Gestation.* This condition may be responsible for a large number of cases of uterine bleeding. Here we find in the typical history the skipping of a period or periods or even possibly a delayed period, attacks of pain on one side of the pelvis or the other, and in some cases the passing of decidual shreds. On examination we find a soft cervix, the uterus is usually slightly enlarged, it may be pulled to one side or the other by a sensitive mass varying in size, there may or may not be an accumulation in the cul-de-sac of Douglas, sensitiveness is usually elicited by raising or lowering the cervix. There is a bloody discharge, a slight rise in temperature, and a moderate leucocytosis. The red count and hemoglobin will vary according to the blood loss by rupture, the changes being slight before rupture and accentuated after this has taken place. The treatment of ectopic gestation is the removal of the organ of the affected side together with the products of pregnancy. This may be preceded and followed by transfusion as indicated by the patient's physical condition.

3. *Hydatidiform mole* or cystic degeneration of the chorionic villi is one of the causes of uterine bleeding associated with pregnancy. The cysts vary in size from a millet to a grape seed, and their structure is such that they spring one from the other. The mole has a characteristic appearance and resembles no other pathological condition. According to Kehrer it may be partial or total, depending upon whether a few chorionic villi, a few cotyledons or the whole chorionic membrane take part in the degenerative process. The edema, which at first disassociates the stroma of the villi, disappears, the villi become vesicular, their epithelial covering proliferates, the Langhans cells and especially the syncitium form individual cells which invade the decidua and even the uterine muscle. The individualized syncitial cells are voluminous, elongated and multinuclear, they invade the maternal tissues massively, and make their way through the decidua. They persue their invasion and show a predilection for vascular cavities in which they may fall. The mole then shows the histological characteristics of a malignant tumor although Faure states that malignant transformation is found only in one tenth of the cases.

The uterine hemorrhages associated with this condition may clear up with the expulsion of the mole. Persistent bleeding, slight though it may be, calls for the exploration of the uterus preferably with a dull curette, remembering that the invaded uterine wall is exceedingly friable and may be readily perforated. Some authors feel that the treatment of hydatidiform mole should be hysterectomy because of the close association of this condition with chorion-epithelioma. While this method is no doubt effective, it is considered by the majority as too radical since numerous normal pregnancies have been observed in uteri in which a previous mole had existed.

4. *Chorion-epithelioma,* when established, leads to serious uterine bleeding. This malignant neoplasm generally follows labor, abortion, tubal pregnancy, and in about fifty per cent of the cases, hydatidiform mole. The lesion is usually found within the uterine cavity although primary lesions have been reported from the Fallopian tubes and the vagina. The main characteristics of the tumor are profuse hemorrhage, unusual malignancy and rapid and widespread metastases, especially to the lungs. This condition should always be

suspected when uterine bleeding returns after the expulsion of a mole. The only treatment is total hysterectomy with the ablation of the adnexa. The prognosis depends upon how early this is performed. There is usually no difficulty with the operation itself but the early metastases always leave one in doubt as to a permanent cure.

5. *Placenta Previa.* Uterine hemorrhages without pain, in the last trimester of pregnancy are usually due to one of the varieties of placenta previa, the bleeding usually varying with the type found, sudden and excessive hemorrhages occurring from the central implantation. This type of bleeding is controlled by the appropriate obstetrical treatment.

6. *Ablatio Placentae and Uterine Apoplexy.* Uterine bleeding with pain in the last trimester of pregnancy is usually due to the premature detachment of the normally implanted placenta. The hemorrhage varies with the amount of separation present. In the severe cases, where complete detachment may exist, there is found an effusion of blood varying in extent in the myometrium, and a disassociation of the individual muscle fibers. The process may involve the anterior and posterior uterine walls and in some cases may extend to the broad ligaments and to the tubes and ovaries. The uterus has an ecchymotic mottled appearance which gives it the appearance of an ovarian cyst with a twisted pedicle. The point of maximum involvement of the uterine wall is usually found at the site of the placental insertion, and the lesion may be either unilateral or bilateral, but always more severe on the side toward which the placenta has its greatest area of attachment. The name of uterine apoplexy has been applied by Couvelaire to the severe form. The treatment is obstetrical in the milder forms and cesarean section with the conservation or ablation of the uterus in the severe cases.

Placentoma may lead to uterine bleeding up to the point of severe anemia. This is not a new growth but consists of organized blood clot, and remnants of placenta and membrane. The mass is attached to the uterine wall and varies in its location as well as in size. The condition may be avoided by thoroughly emptying the uterus when caring for an abortion or miscarriage. When it exists, the placentoma is removed by ovum forceps or by the dull curette. In presence of hemorrhage the uterus should be firmly packed with iodoform gauze.

BLEEDING NOT CONNECTED WITH PREGNANCY

(a) From benign conditions:
1. Endocrinal hemorrhages.
2. Hypothyroidism.
3. Blood diseases.
4. Vascular hypertension.
5. Uterine fibroids.
6. Uterine adenomyomata.
7. Polypi, cervical and corporeal.
8. Uterine malpositions and lacerations of the cervix.
9. Subinvolution of the uterus and hyperplasia of the endometrium.
10. Pelvic inflammation.
11. Benign tumors of the ovaries.
12. Functional bleeding.

(b) From malignant conditions:
1. Carcinoma of the cervix.
2. Carcinoma of the corpus.
3. Sarcomata.
4. Malignant tumors of the ovaries.

HEMORRHAGES FROM BENIGN CONDITIONS

Endocrinal Hemorrhages. The hemorrhages of puberty, which one meets not infrequently in the course of gynecological practice, are due to overactive ovaries and a hyperactive thyroid gland. According to Oliver, the treatment should be large doses of posterior pituitary administered intramuscularly to control the thyroid; these doses must be continued until the pulse rate at the period is 80. Rest during the menstrual period should not be overlooked as an important part of the treatment. In the uncontrollable hemorrhages of adolescence radium in small doses has been

proven to be of marked benefit. Recently the writer saw within two days two young women who had had menorrhagia and metrorrhagia since the onset of menstruation. They were eighteen and nineteen years of age respectively. One of them had started to menstruate at thirteen years of age and had had some show of blood daily from then on. The periods were full each month and in addition there was bleeding, varying in amount every day during the intermenstrual phase. Both of these young women were so improved with a small dose of radium that they were soon able to resume their occupations with comfort.

Hypothyroidism, as a cause of uterine bleeding is explained by Meigs on the basis of a possible association between a hypersecreting ovary and a hypofunctioning thyroid. Meigs, in reporting a case of this type, stated that it suggests that the ovary in some way compensated for an abnormally low thyroid secretion and in consequence of the hypersecretion of the ovary the patient had menorrhagia. The treatment of uterine bleeding of hypothyroid origin suggests the careful administration of thyroid extract therapy.

Blood Diseases. Hemophilia and chlorosis should be considered as definite causes of uterine hemorrhages in a small number of cases, although in many instances of chlorosis amenorrhea is the rule. Proper medical treatment for these conditions should be instituted, and in addition blood transfusions should be resorted to.

In the presence of a definite purpura hemorrhagica with few platelets, long bleeding time, short coagulation time, and poor clot retraction, uterine bleeding may be severe. The treatment according to Meigs should be roentgen-ray exposures over the spleen. Failing to get results with this, a splenectomy has to be considered.

Vascular hypertension is responsible for a certain number of uterine hemorrhages. The loss of blood through the uterus acts as a safety valve as it does in epistaxis. The treatment, medical and dietary, is directed towards lowering the blood pressure.

Uterine fibroids are probably the cause of hemorrhages from the uterus in the largest number of cases. The bleeding varies with the size and position of the tumor, the severest hemorrhages accompanying the submucous variety, while there may be but little bleeding from the subserous form, especially if pedunculated. The intramural myoma occupies a place between the other two varieties. The treatment of fibroids again depends upon the size and the location of the growth, and the age of the patient. In the young woman myomectomy is advisable whenever it can be practised. When this is not possible a fundal hysterectomy with the conservation of the adnexa and consequently the function of menstruation is the method of choice. Radium should not be used during the childbearing period except in rare instances, because of its selective action upon the ovaries. After the menopause the opinions are divided between those who favor radium on the one hand and those who favor surgery on the other. As far as radium is concerned, it finds its largest field of usefulness with the intramural tumors, not exceeding in size a four-month pregnancy. Its action on the subserous myomata is slight while it is dangerous to use it with submucous myomata because of the danger of necrosis and sloughing. Radium is of great value in arresting the hemorrhage in the exsanguinated woman; its application in that type of case should be preceded by a blood transfusion. Here it may not be used with the idea of effecting a cure but merely to stop the bleeding, allow the patient to gain in strength, and permit the performance of a hysterectomy at a later date. In the good surgical risk, at or after the menopause, hysterectomy, subtotal in the presence of a normal cervix, or total when the opposite obtains, is considered by the majority as probably the best form of treatment.

Adenomyoma of the Uterus. An adenomyoma is a tumor containing adenoid structure, connective tissue and smooth

muscle fibers. These neoplasms, which are much less common than myomata, may develop in the uterine body, the round ligaments, the Fallopian tubes, the recto-genital space, the alimentary canal and the umbilicus. These growths like myomata may be subserous, intramural, submucous and interligamentary. It is now generally believed that the gland elements in these structures are derived from the endometrium.

Cullen, who made an intensive study of the tumors, found the uterine mucosal relationship in all his cases. The main symptoms from these neoplasms are bleeding, secondary anemia, and resulting nutritional disorders in other organs from the loss of blood. The only treatment for this condition is hysterectomy. The total extirpation of the uterus is to be recommended. Preliminary blood transfusions are frequently indicated. No attempt at enucleation should be made because of the glandular elements present.

Polypi, Cervical and Corporeal. The most prominent symptom of mucous polypi is uterine bleeding. The tumors, which may be of large size, may be single or multiple. In the cervix they are usually preceded by an endocervicitis. They spring from the endometrium, are bright red in appearance and covered with epithelium. The stroma of their pedicles is edematous and very vascular. The bleeding may be increased at the period, or intermenstrual bleeding may be present. The treatment consists of their removal; this may be simple when they are single, more complicated when they are numerous. The splitting of the cervix, anterior vaginal hysterotomy, may be necessary to reach their pedicles. Amputation of the cervix above the polypi-bearing area occasionally has to be resorted to. It may sometimes be necessary to split the anterior wall of the uterus from cervix to fundus to resect the pedicle of a fundal polyp. Rarely is hysterectomy indicated for this condition. Small doses of radium, after curetting the bases of the polypi, will take care of a definite group of cases.

Malpositions of the Uterus and Lacerations of the Cervix. Malpositions of the uterus, associated or not with prolapse, together with lacerations of the cervix and consequent erosion, ectropion and endocervicitis result in not a small number of cases of uterine bleeding. Proper obstetrics will tend, in a large measure, to decrease the number of patients who fall in this grouping. The rule that no obstetric interference should be attempted until the full dilatation of the cervix, if followed, would show a marked decrease in the extensive lacerations of the cervix with hypertrophy of the lips and leucorrhea. By the same reasoning the avoidance of forceps operations through an imperfectly dilated cervix would avoid the stretching of the cardinal uterine ligaments, and the lacerations of the pelvic floor with the resultant subinvoluted, retroposed and prolapsed uterus. As we see these lesions most frequently in women nearing the menopause, it is necessary to rule out carcinoma of the cervix and uterine corpus before performing the necessary operations to repair the lacerations, reconstruct the pelvic diaphragm and bring the uterus in its normal position by fixing or shortening its ligaments.

Subinvolution of the Uterus and Hyperplasia of the Endometrium. In this group are found those who have severe hemorrhages of the menorrhagic type but where myomata and malignant conditions are absent. The uterus is somewhat enlarged and its walls are thickened, although this change is not always sufficiently pronounced to be noted on bimanual palpation. The uterine walls are thicker and firmer than those of a normal uterus and contain a large proportion of fibrous tissue. The typical vessel changes which occur during involution after parturition are present, namely the formation of new vessels inside the old, but these are not complete as demonstrated by the presence of a new layer of elastic tissue in the vessel. There is a condition of subinvolution and round cell infiltration showing that the

change is inflammatory in character. According to the predominant change the condition may be called "chronic metritis," "chronic subinvolution" or "fibrosis uteri." The term of "heavy fibroid uterus," used by the old writers, is not far from appropriate. Changes in the endometrium are also apparent, a hypertrophy with polypoid formation or a thickening with an increased amount of glandular or interstitial tissue resembling an endometritis. The uterus which is the seat of a marked subinvolution by its greater weight, as a rule, occupies a posterior or backward position. Menorrhagia may manifest itself early after labor or it may be delayed. The hemorrhages may not occur until the patient approaches the menopause.

The treatment of this condition is far from easy. During the childbearing age, it is said that a cure for subinvolution may be obtained by a subsequent pregnancy followed by a normal puerperium. The less severe cases may be treated by the use of drugs, such as pituitary extract, ergot, hydrastis, and calcium lactate in doses of 60 grains a day for a period of a week. Curettage followed by the use of these drugs is frequently successful. Hysterectomy, vaginal or abdominal, is rarely indicated unless it is done in connection with other operations for the repair of lacerations and in the presence of diseased appendages.

Radium therapy is most useful in these cases. By its selective action on the endometrium and ovaries a dose varying from 1200 to 1500 milligram hours has controlled the bleeding in all the cases which have come to the author's attention thus far.

Pelvic Inflammation. Menorrhagia is not uncommon in acute inflammation of the Fallopian tubes. It is more pronounced with the involvement of the ovaries in the process. Bleeding is also noted in perimetritic inflammatory conditions. The prolonged and excessive menstruation associated with these conditions rarely assumes serious proportions. It may persist with a few periods, but it usually subsides as the inflammation improves. The bleeding is likely caused by the increased congestion due to the inflammation, and rarely requires special treatment. The treatment should be directed to the inflammatory condition rather than to the bleeding.

Benign Tumors of the Ovaries. Tumors of the ovaries cause uterine bleeding. Hemorrhagic cystic disease is the most common cause. Simple cysts and dermoids, unless having a twisted pedicle, seldom cause bleeding. The diagnosis is made on the history of bleeding either increased at the periods or intermenstrual, and the finding of the tumor on bimanual examination. The treatment is surgical and consists of the removal of the cyst or of the cysts and the ovary.

Functional Bleeding. The captions functional, essential, idiopathic or intrinsic hemorrhage have been frequently used in the literature. They refer to the bleeding which usually occurs at the menopause. These hemorrhages are always to be differentiated from cancer. Cancer of the cervix offers no special difficulty as the mere inspection through a speculum will usually reveal its presence. In suspicious cases a biopsy with histological examination will settle the diagnosis. Cancer of the body is found by means of a diagnostic curettage with microscopic examination of the scrapings. In the absence of cancer the curettings may reveal the condition which Cullen designated as "hyperplasia of the endometrium." A disturbance of the ovarian function is usually the cause, since it has been demonstrated to occur during the period of ovarian activity, since it returns after a curettage and since the bleeding and the hyperplasia disappear after the ablation of the ovaries or radium therapy.

FROM MALIGNANT CONDITIONS

Carcinoma of the cervix uteri is unfortunately a very common lesion. There always exists some bleeding irregularity,

which may take the form of a blood-stained discharge, or slight bleeding after coitus or after examinations, up to the severe hemorrhages by erosion of the vessels in the advanced cases. The first unmistakable sign may appear only when the disease is well advanced, especially when the growth has found its origin in the epithelium of the cervical canal. Every woman who complains of any excessive or irregular bleeding or of a blood-stained discharge, especially when nearing or at the menopause should be carefully examined. If there is no sign of carcinoma of the cervix there still remains the possibility of carcinoma of the endocervix or of the uterine corpus. The examination may have to be done under an anesthetic; it should consist of careful palpation and inspection through a speculum. It is essential to dilate the cervical canal, then to explore the uterine cavity and the cervical canal with a curette. The scrapings should be carefully examined histologically. The importance of diagnosis and treatment at the earliest possible moment cannot be overemphasized, since early diagnosis is probably the most important point in considering the prognosis. The treatment of carcinoma of the cervix is far from standardized. The prophylaxis should be constantly borne in mind. Carcinoma of the cervix in the majority of cases develops on an organ which is the seat of lacerations, erosions, ectropions and ulcerations. The disease seldom appears on a healthy cervix. With this end in view it behooves us to overcome the so-called precancerous lesions. The lacerations with their accompanying ectropions may be healed by a trachelorrhaphy, a conical amputation of the cervix or a high amputation of the organ as the case may demand.

The ulcerations and erosions may be successfully treated by making use of the cautery, or by small doses of radium. It has been proven through observation that if this plan of treatment is followed, the incidence of carcinoma of the cervix will be very low.

With fully developed cancer opinions as to treatment vary considerably; all agree that radium and roentgen-ray therapy offer the only hope in the advanced cases. In the early cases, however, the choice rests between the above and the radical operation, consisting of the removal of the uterus with a wide vaginal cuff, the adnexa, the parametria and the iliac glands if involved. Adherents of each method give a number of points in its favor. In America a great number of experienced gynecologists have given up surgery for the treatment of carcinoma of the cervix and use radium and roentgen rays exclusively. In favor of the latter method, we have no primary mortality, no serious complications such as sloughing of the ureters, and as large a percentage of five year cures. With proper filtration and screening when employing radium, the fistulae which occurred in the early days have practically almost entirely disappeared. A number of continental gynecologists a few years ago advised healing the cervix with radium, then performing the radical operation, and following this with deep roentgen-ray therapy, thus using the three methods at our command to combat cancer of the cervix. It was soon found that following operation, recurrences occurred sooner and more frequently when the combination of radium and surgery were used than when either method was used alone. Moreover, the recurrence is seldom found in the uterus itself when it has been properly radiated but usually in the parametria or the pelvic glands so that the removal of the uterus does not help in this respect on the one hand, and on the other we must take into consideration the definite mortality of a radical hysterectomy. The writer gave up the radical hysterectomy for radium and roentgen-ray therapy five years ago and is convinced that his results are improved with this plan of treatment.

Carcinoma of the Corpus Uteri. Bleeding and blood-stained discharge after the menopause always suggest malignant disease, but whereas, according to Gordon,

before the menopause and the age of forty-five cancer of the cervix is twenty times more probable than cancer of the body of the uterus in women who have borne children, as the age of fifty is approached the probability of carcinoma of the body of the uterus becomes equal to that of carcinoma of the cervix.

Cancer of the uterine body originates in the glands or epithelium of the endometrium, is usually not rapid in development and remains local for a much longer period of time; except in its advanced stages it can only be diagnosed by an exploratory curettage. The large percentage of cases are operable when first seen, and here in contradistinction with carcinoma of the cervix, a panhysterectomy with ablation of the adnexa is the treatment of choice and is followed by very good results. In the so-called operable cases radium may be advisable only when an organic lesion contraindicates the operation. When cancer of the body of the uterus has become inoperable, when it has broken through the uterine wall and the neoplasm involves the surrounding structures, the intestines and omentum, the treatment should be palliative, as neither radium nor roentgen rays can be used with safety.

Sarcomata of the uterus give rise to bleeding. Clinically it may be impossible to differentiate a sarcoma from a myoma. It is an established fact that a myoma may become a sarcoma. Sarcoma usually occurs later in life than myoma, and in a woman who has passed the menopause a uterine tumor which grows rapidly should make one suspect sarcoma, as the ordinary myoma is, as a rule, never rapidly growing at this age in life. The treatment of sarcoma of the uterus is the ablation of the entire uterus together with the adnexa.

Malignant tumors of the ovary may cause excessive uterine hemorrhages due to the disturbance of the ovarian secretion. This may occur even after the menopause has been established for a long time. Chalfant reports the case of a woman sixty-three years of age, the mother of six children, who had the menopause at fifty. Thirteen years later a large ovarian cyst was discovered. This was associated with uterine bleeding. The uterus was the size of a two and one-half months pregnancy and carcinoma of the fundus was suspected. At operation, which consisted of the removal of the entire uterus, the tubes, the large tumor of the left ovary and a normal atrophic right ovary, it was found that the uterus was typically arteriosclerotic with thick walls and a normal, rather thickened endometrium. The treatment of malignant growths of the ovary consists in their surgical removal.

Although this paper does not lend itself to a summary, one conclusion may be drawn and that is, the presence of uterine bleeding demands a careful bimanual examination, a speculum examination and a diagnostic curettage in all cases in which pregnancy can be excluded.

THE EXTENSION OF THE SURGERY OF NEOPLASTIC DISEASES BY ENDOTHERMY*

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SOME seven years ago the writer, dissatisfied with the results obtained in the surgery of malignancy, and moved by Doyen's conclusion that, "of all means employed in the destruction of pathological lesions the only certain method is that of heat," went to electrotherapy to find the best method of inducing heat in the tissues.

There was a rich literature devoted to the methods and results of the application of high frequency currents to disease and, although considerable patience was needed to untangle the confused nomenclature of its presentation, the investigator was repaid by findings covering a period of more than twenty years.

Doyen and Nagelschmidt had demonstrated so long ago the high value of electric coagulation in the destruction of malignancy. Clarke of Philadelphia had for more than fifteen years used with brilliant success the lighter current to accomplish that desiccation by which lesions of the more delicate tissues may be destroyed without injury to surrounding areas. It was impossible to doubt the authenticated results which these men and many others presented—results far outweighing the unwarranted claims by which less scientific students had brought criticism upon the whole field of electrotherapeutics.

Our own interest in what has been developed as endothermy was greatly stimulated by our experience with a case of tumor of the bladder. The usual suprapubic incision was made by the scalpel. The growth was exposed by electric light in the bladder and was desiccated in situ and removed. The bladder was then sutured in the usual way, without drainage. After three months cystoscopic examination showed the site of the lesion so free that it was difficult to be sure just where the growth had been. Along the line of the scalpel's incision, however, were three carcinomatous nodules. There could not be a more graphic picture of the beneficent action of the high frequency current as contrasted with the scalpel's lack of protection against the implantation of malignant cells. The need of perfecting a cutting current which should extend surgery's usefulness as a weapon against neoplastic growths seemed urgent.

From the realization of this need the perfected cutting current, the endotherm knife, was developed and presented before the Surgical Section of the State Medical Society in Rochester, April, 1924. In reporting our work we realize that it is not conclusive. Sufficient time has not yet elapsed nor have we had a sufficient number of cases for us to offer final results. The work is, however, indicative and on this ground it is presented.

As we hereafter discuss the methods by which results are achieved it will be observed that a sound surgical training is the basis of its successful employment. But equally important is a thorough knowledge of the precise use of the currents for they differ widely in character and effect.

In the treatment of localized malignancy which can be immediately removed we no longer use roentgen ray or radium.

*Read before the Surgical Section, New York Academy of Medicine, Feb. 3, 1928.

Fig. 1.

Fig. 2.

Figs. 1 and 2. R. A. Five years old. Fibro-angio-sarcoma of scalp. At birth the child showed nothing abnormal except a black mark on the posterior half of the scalp, the size of a twenty-five cent piece. Note metastatic glands of the neck. On June 17, 1925, the growth was excised by the endotherm knife with but little hemorrhage and no surgical shock. Healing has been steady and uninterrupted. By undermining the skin the glands of the neck were coagulated by bipolar endothermy and left in situ to be absorbed. Microscopic examination established the fibro-angio-sarcoma diagnosis. Note glands of both sides of neck.

They are time-consuming, uncertain in action and in this type of case should not be employed.

Fig. 3. Lesion healed after excision with the endotherm knife.

Recent knowledge and Broders' classification of neoplastic growths on the basis of cell differentiation or degree of malignancy have shown the folly of generalization in treatment. Although surgery still remains the cancer sufferer's chief hope, it is as wrong to cut all cancers as it is to treat all cancers by physical measures. Grades one and two, being less malignant, are more responsive to treatment and can be reached by a wider range of curative measures than can grades three and four, which offer far less hope if attacked solely by conventional means. The value of this to the patient is very great. So many cases of cancer, however, are already beyond the reach of the scalpel when first seen by the surgeon that there is urgent need for a new method. To illustrate:

In 1925, Simmons of Boston, reporting from the Collis P. Huntington Memorial Hospital, found that of 103 cases of carcinoma of the tongue who applied for treatment, 76 were inoperable. Similarly, Judd and New, of the Mayo Clinic, reported that of 303 cases of carcinoma of the tongue which came under their observation between January 1, 1910 and January 1, 1922, 186 (61 per cent) were inoperable. To seek to limit the number of these so-called inoperable cases merely by urging early examination and earlier operation is not enough. There is need of an extension of surgery's applicability

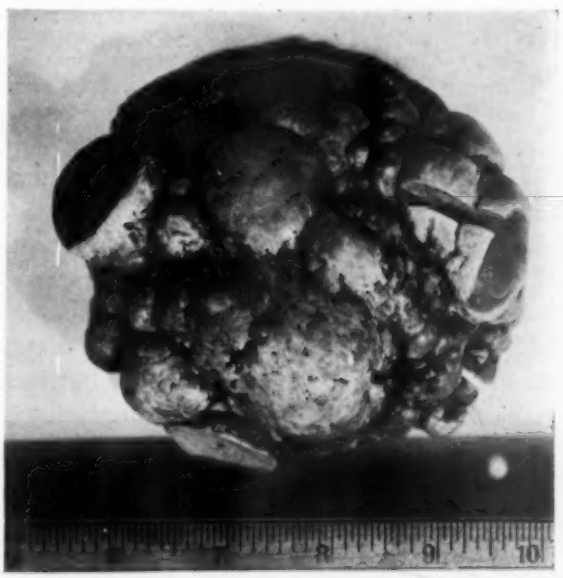

Fig. 4.—Gross specimen removed in toto.

that will not only reach a much larger percentage of cases as they apply but will reach them with more lasting benefit.

Judd has since said: "For growths too extensive for radical surgical removal diathermy offers the best prospect." We go further and suggest that a remedy which offers the best prospect in cases too extensive for scalpel removal offers also the best prospect in cases not too extensive for scalpel removal.

Fig. 5. Photomicrograph of fibro-angio-sarcoma. (Figs. 1–5 from Wyeth, G. A., Surgery of Neoplastic Diseases by Electrothermal Methods. New York. Paul B. Hoeber, Inc., 1926.)

In endothermy we have three procedures: to desiccate the malignancy, to coagulate the malignancy, or to exercise the malignancy with the endotherm knife which seals lymphatics as it cuts. There is also a technic of combining the use of the coagulating and the cutting currents to make possible the destruction of malignancy in situ and its excision as a dead mass instead of as a group of viable cells. This greatly reduces the danger of metastasis and the likelihood of recurrence, and the operation can be done without hemorrhage. These several procedures are not interchangeable; each has its own indication and should be learned and used accordingly.

It is in the field of mouth carcinoma that endothermy finds its greatest usefulness. Danger of mechanical transplantation is minimized, hemorrhage and surgical shock are eliminated and there is an immediate sterilizing effect of intense heat upon the foul, painful area which permits the early return to normal diet. In all cases of cancer of the oral cavity we realize that the great problem lies in the neck. In the brief space allotted this paper there can be no discussion of detailed treatment. We would say only that our experience has lead us to share the view of Mr. Clayton-Greene and his English confreres. Mr. Clayton-Greene says: "I am becoming more and more doubtful as to the value of big gland dissections practised in cases of carcinoma of the tongue. If the glands are not involved the operation is unnecessary and if they are extensively affected it does not seem to prevent recurrence." To the surgeon whose teaching has included the removal of all glands of the neck in treating cancer of the mouth and who is unwilling to change the fixed routine of the operation, we suggest only that in the endotherm knife there is provided a means by which this dissection may be done without opening lymphatics.

In those exceptional cases, melanomas and the various malignant lesions which by their very extent or by the depth of their involvement must be classed as inoperable by any careful user of the scalpel, endothermy greatly extends surgery's usefulness. Its results cannot be dismissed as the accomplishment of a cautery and endothermy should not be spoken of as cauterization. There is no burning. The applicator is always cold when applied, the heat coming from within the tissues in response to the many oscillations of the high-frequency current.

In tumors of the breast endothermy finds further opportunity for service. Archibald Leitch, Director of the Cancer Research Institute, London, said in 1925: "The surgical treatment of cancer of the breast has not undergone any marked improvement during the last quarter of a

century; nothing that is both new and true has been added in that time to our knowledge of the surgical pathology. It would appear as if the limits of operation had been reached. . . . It is a fact that only some 10 per cent of cases that have been operated will be alive after ten years."

We believe that it is now time to mention something that is both new and true by way of improvement in the technic of breast cancers and to indicate briefly the radical breast operation in the new endothermic methods. We have recently done a number of radical breast operations as well as excised various suspicious looking nodules, using electrothermic methods alone, securing primary union in all but one, a simple amputation in a fat patient. In the radical procedures the axillary and infraclavicular tissues were also completely dissected out with the endotherm knife."

Fig. 6. Appearance February 18, 1928. Glands have been completely absorbed and are no longer palpable. Scar is from old biopsy.

Fig. 7. F. M. Female, thirty-five years old. Grade IV (Broders) squamous cell epithelioma of the tongue. Hemiglossectomy without hemorrhage and shock by bipolar endothermy and the endotherm knife (June 6, 1927). This figure shows appearance February 16, 1928.

different methods of attack in several breast conditions. First, in the very early cases of breast tumors where there is but the presence of a suspicious nodule, we use a very fine needle for the cutting current and incise down to the small tumor. Gradually elevating it by working around it, we remove the nodule without opening the lymphatics. We are thus enabled to make a definite microscopic diagnosis without jeopardizing the patient through mechanical dissemination. In discussing radical amputation of the breast with the endotherm knife and without ligatures, Kelly of Baltimore, welcomes changes which tend to shorten the length of operation and decrease the handling of the wound while protecting the patient from the likelihood of infection and the dissemination of tumor cells. He says: "We believe we have such an improvement in

In advanced carcinoma of the breast, particularly of the fungating variety, if the roentgenogram shows no bone or lung metastasis and the patient's balance has not been broken, by the combined technic of bipolar endothermy and the endotherm knife we perform a two-stage operation which isolates and immediately removes the offending part first and later cleans out the axilla and cares for the supraclavicular space.

There is time to speak but briefly of the cases of malignancy located in cavities which may be made accessible, such as malignancy of the antrum, larynx, bladder. One would say in general that it is our custom to open the cavity with the endotherm knife, expose the neoplastic growth to full view and proceed to destroy and remove it after the indicated technic of endothermy. Surely one is justified in

first offering to his patient this alternative of electrothermic destruction before submitting him to the crippling operation of complete laryngectomy for a beginning carcinoma.

The procedure is a new one and in recommending new methods and the modification of old methods to the attention of the profession we would quote what Dr. Lewis McArthur so effectively said at the meeting of the American Medical Association in St. Louis. Urging upon his colleagues the importance of deviating from accepted surgical axioms and even, in rare instances, operative procedures at variance with established surgical teaching, Dr. McArthur said: "Otherwise surgical judgment is banished and surgery becomes a set of formulas; the surgeon disappears and there remains only the operator."

THE DIAGNOSIS OF ACUTE INTESTINAL OBSTRUCTION*

WALTER A. BAYLEY, M.D., F.A.C.S.

LOS ANGELES

THE mortality of acute intestinal obstruction still stands close to 50 per cent and is almost entirely due to failure in making an early diagnosis. Unfortunately early diagnosis is often as difficult, although an operation at this time is comparatively simple and safe. If the condition is allowed to go on for a few hours the diagnosis then becomes easy, but the operation becomes a difficult and dangerous one, only too often followed by the death of the patient.

For the purpose of diagnosis I have been accustomed to making a classification into four groups covering about 95 per cent of the cases.

Strangulated External Hernia. This is generally easily diagnosed as the patient is usually aware of the existence of the hernia; it has suddenly come down, is tender, tense and irreducible; and this condition is accompanied by abdominal pain and vomiting.

The Obstruction of Infancy. This is almost invariably due to intussusception and the cardinal symptoms of pain, shock, vomiting, mucous and blood in the stools, with the presence of an abdominal tumor, will generally make the diagnosis clear. It is important to remember here that the pain is not continuous, corresponding to the violent contractions of the gut; that vomiting is not severe at first and that constipation may not be absolute until late. Also the tumor may be hidden under the edge of the liver.

The *Obstruction of Old Age.* In my experience this has almost always been due to cancer of the colon, usually at or near the rectosigmoid junction, although of course it may occur in other parts of the large bowel. A history of increasing constipation in an elderly person followed by distention, abdominal pain and vomiting, the last usually a late symptom, should make one suspicious.

Obstruction Due to Bands and Adhesions. This is usually found in adults up to middle age but may come at any age. Strangulated hernia is generally easily recognized and intussusception is not common. Cancer of the colon carries with it the high mortality of cancer on account of our present inability to recognize it early, but the high mortality of acute obstruction so often caused by bands or adhesions should be reduced far below its present rate. The fate of the patient is almost always in the hands of the first physician called. Any patient who is suddenly taken with severe cramp-like pains in the abdomen quickly followed by vomiting, which increases in frequency as time goes on, and who has a normal or subnormal temperature should be considered as having an acute obstruction until the contrary can be proved. This is especially so if a right rectus or a mid line operation scar below the umbilicus is present, or the patient can give a fairly definite history of a previous peritonitis. Waiting for feculent vomiting is like waiting for the typical appearance of diffuse peritonitis before making a diagnosis of appendicitis.

In making a diagnosis the important points are a previous history of an operation for appendicitis, pelvic disease, or intestinal obstruction. Here it must be noted that an operation for appendicitis through a McBurney incision is much less likely to be followed by an obstruction than when the right rectus incision is used. Upper abdominal operations are rarely followed by obstructions. Occasion-

* Read before the Los Angeles Surgical Society, February 11, 1927.

ally cholecystectomy is followed by stenosis of the duodenum.

We have found that sudden onset is the rule. The pain is usually severe from the start and is usually referred to the epigastric or umbilical region, though occasionally to the hypogastrium. It generally comes in spasms but may be continuous if a considerable segment of the bowel is involved. Pain is often accompanied by primary shock but generally this wears off in a short time and when the physician arrives may not be apparent. Vomiting comes on early and continues. The longer the condition lasts the more frequent the vomiting, as a general rule. Also the higher the obstruction the earlier the onset. The vomited material comes in the following order: stomach contents, green bilious material which gradually changes to yellow or greenish brown and finally the brown, fowl-smelling feculent vomitus appears which tells us that the condition of the patient has become desperate. Lavage seldom relieves for any length of time.

The temperature is normal or subnormal. Rarely is there an elevation of as much as a half a degree until late in the disease when peritonitis has become a complication.

Early in the obstruction the pulse usually gives us little indication of the severity of the patient's condition. If seen in the state of primary shock it may be rapid and weak and occasionally in cases of strangulation of the gut remains so.

The bowels may move one or more times with or without an enema. This should never be forgotten and I believe is the cause of more delay in diagnosis than all the other factors combined. The nurse reports a fair bowel movement following an enema and delay is decided upon. We are not anxious to operate upon a patient who possibly already has had one or more operations, nor is the patient very willing to go through the ordeal again. We decide to wait a few hours and the damage is done.

The appearance at examination is not especially suggestive. I have always been in the habit of telling internes that in case of obstruction the patient is much sicker than he looks. Late in the disease it isn't necessary for a physician to look at the patient to say that he is desperately ill. Anyone can tell it. A description of his appearance at this time is unnecessary.

A routine general physical examination should always be made but here I will speak of the abdominal findings only. Inspection is of great importance and should always be made in a good light. The abdomen is flat or only slightly distended, depending on the conditions within. Always look for operative scars below the level of the umbilicus. If present, find out if drainage had been used. If visible peristalsis is seen, it is diagnostic of a chronic obstruction which has become acute. In these cases pain, shock, and vomiting are usually less at first, and some distention will generally be present. If the abdominal wall is uneven presenting the appearance of more or less transverse or oblique folds (called the ladder pattern), there is an obstruction of the lower ilium present. I have never seen this or the preceding sign fail. Unfortunately the ladder pattern, due to the distention of various coils of small gut is not a particularly early sign.

Tenderness usually is not present until distention appears. Rigidity is absent. Rigidity means inflammation of the peritoneum or perforation or both. In obstruction it does not appear until late when there may be some local peritonitis around the obstructed area. Often it is absent even then, as the patient has become so toxic by this time that muscular defense is lacking. A pelvic and rectal examination should always be made, but it rarely gives much information. However, it is necessary for differential diagnosis. In my experience percussion has been of no value. It is said to be of value in determining shifting dullness but practically I have never been able to make use of this sign.

There are two signs in acute mechanical obstruction which are of great value. The first is a high pitched musical tinkle due to gas and fluid moving in a tubular space.

The second is probably caused by the presence of free fluid under tension, although it is possible that distention of the gut above the point of obstruction with fluid and gas may have something to do with it in some cases. The sign referred to is a transmission of the heart sounds through the abdomen to the abdominal wall and may be heard in any or all four of the quadrants depending on conditions present. The lower on the abdomen that it is heard, the more diagnostic it appears to be. This is not the pulsation of the abdominal aorta, as the first and second sounds can be distinctly heard. When present it is a fairly early sign. Late in the disease it becomes fainter with failing heart action. I have found this sign many times and often it has been the deciding factor for operation. In obstruction it has not been present unless there was strangulation or volvulus, as these are the conditions in which there is free fluid in the abdominal cavity. It has been reported as occurring in other acute abdominal surgical conditions, as ruptured tubal pregnancy and diffuse peritonitis, but here the history will generally serve in making a differential diagnosis. It must be remembered that it does not occur in all cases and only when present and taken in conjunction with other symptoms and signs is it of value as confirmatory evidence.

The number of leucocytes in the blood is variable and generally of little aid. Urinary output is decreased probably on account of inability to retain fluids. Blood chlorides are diminished and a rise in the carbon dioxide combining power of the plasma and a rise in the non-protein nitrogen may occur. Generally in practice it is necessary to make a diagnosis without the aid of blood chemistry.

I wish to make a brief report of two cases operated upon in which the presence of the heart sounds helped to confirm the diagnosis.

Case I. Miss M. H., a nurse, aged 23, was operated upon for acute appendicitis five weeks previously at which time it was necessary to use drainage. Convalescence uneventful. Admitted July 21, 1926. History of severe abdominal cramps commencing forty-eight hours previous to admission. Pain began in the epigastrium, radiated over the front of the abdomen and was spasmodic in character, causing the patient to double up. Vomited frequently and was unable to retain anything taken. No bowel movement for two days, temperature 98.6, pulse 100, respiration 24 on admission. White blood count 9,000. Examination showed a slightly distended abdomen with a recently healed right rectus scar. Slight tenderness in the epigastrium, otherwise absent or only very indefinite. No rigidity present. On auscultation both sounds of the heart could be distinctly heard over both upper quadrants and faintly in the right lower.

Diagnosis: acute obstruction, probably lower ileum. Immediate operation advised. Operation disclosed a considerable amount of blood tinged fluid and a volvulus of the lower ileum caused by a band of omentum. Eighteen inches of gut very dark and mottled. After the obstruction was relieved the appearance of the intestine rapidly improved so the abdomen was closed without further operation. Stormy convalescence, but entire recovery in about three weeks.

Case II. Mrs. M. L., an attendant, aged 32, had a sub-total hysterectomy with no drainage in September, 1926. Convalescence apparently normal. Admitted December 29, 1926. History of acute abdominal cramps, commencing at 5 A.M. on day of admission. This was followed by frequent attacks of vomiting. Patient had a good bowel movement after onset and since had a very good movement following an enema. Temperature 98, pulse 74, respiration 20. White blood count 17,040, polynuclear cells 95.5 per cent.

Examination showed a mid line scar below the umbilicus, abdomen soft and not distended. No rigidity. Light palpation caused a recurrence of cramps. Examination with stethoscope, negative. Diagnosis deferred, but obstruction mentioned as possible. December 30th: condition not improved, vomited frequently and still had severe cramps. Stomach lavage gave only temporary relief. Abdomen not distended. Moderate general tenderness present, not especially distinctive of anything. No rigidity. Examination with the stethoscope: heart sounds loud and distinct in all four quadrants.

Diagnosis: acute obstruction probably in the lower ileum. Immediate operation advised. Operation showed a large amount of bloody fluid and a strangulation in the lower ileum by a band of adhesions about three feet from the ileocecal junction. Obstruction relieved and abdomen closed. Convalescence uneventful except that patient has some pain at times in the region of the ascending colon.

In conclusion, I wish to state that this paper is necessarily incomplete. Many types of obstruction have not been mentioned and nothing has been said in regard to differential diagnosis. However, I have attempted to give a picture of intestinal obstruction as I have seen it, disregarding the late cases when diagnosis is easy and operation generally hopeless.

In summarizing this paper, I wish to emphasize the following points:

First: Accurate previous history in regard to operation or abdominal inflammatory disease.

Second: Acuteness of onset and spasmodic character of the pain. Vomiting which increases in frequency generally relieved for a short time only by lavage.

Third: The importance of disregarding bowel movements unless the symptoms are relieved.

Fourth: The positive sign of visible peristalsis and ladder pattern of the abdomen which, however, are not always seen, and when present, often occur rather late.

Fifth: Value of the stethoscope as an aid to diagnosis.

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APPROACH TO THE ACUTE URETHRAL STRICTURE

INTRODUCING A DIFFERENT PRINCIPLE OF LUBRICATION

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THE acute filiform type of stricture of the urethra still occasionally gives the physician or the urologist cause for anxiety. We still find cases being referred to the urologist in which much effort has been exerted, as well as much damage done to the mucous membrane, in trying to "get by" an obstructed urethra.

Unquestionably from the very first attempt the principle of lubrication was largely to blame for failure to pass the stricture. Secondly, the choice of dilating utensils is of great importance, and many strictures are not treated successfully for this reason. It might be mentioned in passing that if a stricture is causing acute retention and the patient is unable to pass any urine, it is safe to assume that the closure is a fairly tight one. The choice of dilator should be a very small sized bougie or a filiform bougie. It is surprising, however, to find that a large catheter or sound was attempted by some one else, thereby causing considerable trouble and only adding more difficulty to the cause. Thirdly, the operator must remember the fact that gentleness, slowness, patience and perseverance are all necessary in the successful management of these cases.

The purpose of this paper is to emphasize the importance of proper lubrication and the technique used. The writer has for a long time believed that the best principle in lubricating the urethra is to lubricate the urethra itself rather than the implement to be used. There are two chief reasons for this. First of all, a lubricated bougie loses its lubricant before getting back into the posterior urethra, and consequently is inefficient. Secondly, the lubricated urethra is all prepared, in all its areas, for the introduction of the implement. Is it not more sensible to prepare the whole urethra with a lubricant, rather than to expect that a lubricated instrument will hold its jelly back to the point where it is most needed?

There is a technique to this method of stricture approach which also has advantages and the writer believes it simplifies the procedure as well as saves considerable time. The lubricant, which is a sterile solution of olive oil with 2 per cent benzocaine (prepared in one ounce containers by the National Drug Co. of Philadelphia), is first warmed to about 105° F. The oil is then injected into the urethra with an Asepto syringe of one half ounce capacity. The meatus is held tightly closed with the operator's left hand. After a few minutes the filiform bougie is picked up with the right hand and inserted, if possible, down to the stricture without releasing the oil. The left hand if then released will allow the oil to escape, and at just this moment the bougie should be passed through the stricture. Nearly always, the stricture will open slightly to let the oil out providing it has been introduced past the stricture in the proper manner.

At times it is of advantage to inject the oil and benzocaine solution into the urethra and let the patient retain it for twelve to fifteen minutes. The local anesthetic does much better work after twelve minutes' contact.

The writer has used this method for the past five years and in many instances it has simplified a condition which, if other methods had been used, would surely have proven more difficult to manage.

RENAL CIRCULATION

FOLLOWING VARIOUS TYPES OF NEPHROTOMIES*

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A STUDY of the circulation of the kidney following the various types of renal incisions now in popular usage was undertaken, with dogs as experimental animals. The kidneys were removed after an interval of one to three months, and the arterial and venous systems were injected with a solution of celluloid dissolved in acetone, which formed a corrosion model of both systems of natural size and which could be studied grossly and microscopically. No attempt was made to study the histological specimens. The non-protein-nitrogens were not done. Phenolsulphonphthalein tests were done before and after operation, but these proved of little value, as the readings were within normal limits. The amount of damage done to the kidney by operation has been considered comparable to the defects in the circulatory systems.

It is assumed that the circulation of a normal kidney is well understood in all its intricate details; that the renal artery is not a true end-artery, as there are anastomoses in the arterial rectae and in the finer branches of the division of the efferent glomerular artery; and that there is a free anastomosis between the neighboring veins, which is not true of the arteries. The fluid injected into the renal artery after the kidney had been removed escaped freely from the vein, but the venous injection did not return by way of the arteries regardless of the pressure used; renal circulation, therefore, is considered irreversible.

The anomalies of the renal artery and vein are very common. Eisendrath has given us a very illuminating article on these conditions and their frequency as found in the cadaver. The most common variations encountered are the superior and inferior polar arteries arising from the renal artery or aorta; and occasionally arterial branches are found arising from the common and internal iliacs, the middle, sacral and inferior mesenteric arteries. Of equal importance are the retropelvic vessels which, as a rule, enter the mesial border and are encountered when a simple pyelotomy is done, or more often, when an elongation of the pyelotomy incision is made into the kidney substance. It makes little difference where these vessels arise so long as their presence is recognized at operation. Variations in the kidney pelvis practically always mean variations in the vascular systems. Since the pelvis is almost always outlined before operation one may anticipate abnormalities in the vessels in abnormal pelves, although a normal pelvis does not necessarily mean normal vessels; consequently the surgeon must ever be watchful for abnormal vessels.

TYPES OF NEPHROTOMY INCISIONS

Every surgeon attempts to cause a minimum amount of bleeding by his incision. While it is not possible to incise a kidney without causing considerable hemorrhage, it is possible to incise the organ without injury to the larger vessels. No one form of incision can be applied to all kidneys, and each incision, whatever the purpose, aims to produce the least possible harm.

Cullen and Derge advocated the use of a silver wire in cutting the kidney parenchyma after the capsule has been incised. They likened the arterial branches to those

* Read before the New York Academy of Medicine, Section of Genito-Urinary Surgery, October 19, 1927.

of a tree and the way in which injury to the branches varies with the stroke of the axe, whether it be inwardly or outwardly driven. They conclude that the value of the silver wire lies more in the rapidity with which the hemorrhage stops and the ease with which it is controlled, than in a lessening of the actual amount of blood lost in a given interval of twenty seconds; also that the wounds produced by the wire cutting from within outward heal more rapidly and with less destruction of tissue than those produced by a knife. It is our experience, however, that none of the kidneys incised by either wire or knife stopped bleeding sufficiently to be left without suturing. Certainly in the human being one would not risk an incised kidney without sutures. A sharp knife injures the minimum number of cells in any incision and with proper sutures a minimum damage will be done to the tissues. The corrosion specimens do not present any differentiation in respect to the instrument used for incision.

The ideal type of incision should: (1) give adequate room to remove the calculus if that be the purpose; (2) give free examination to all the calyces of the pelvis; (3) injure as few blood vessels as possible and preserve all the larger ones; and (4) produce minimum tissue damage. The various incisions used to expose the pelvis in this work were divided in four main groups:

1. The longitudinal incision along the avascular zone of Hyrtle, as advised by Broedel.

2. The transverse incision over the convex border.

3. Extension of the pyelotomy incision as recommended by Eisendrath and Marion, or extension of the pyelotomy incision to the lower pole in the midline.

4. Direct incision over a thin area containing the calculi.

INCISIONS

1. *Longitudinal.* Hyrtle, Zondek and Broedel advised that the longitudinal incision be made just posterior to the mid-convex line, this being the so-called bloodless line. It is always far from bloodless, but does avoid the larger vessels and gives adequate exposure to all the calyces. A number of complete as well as various lengths of incomplete incisions were done.

2. *Transverse.* The transverse incision extending through the convex lateral border to the pelvis is described by Marwedel and Bazy. It is claimed to do less damage to the kidney tissue and cause less interference with the circulation. The calyces can be mapped out from the surface and the columns of Bertin can be accurately determined by following the depressions on the surface of the kidney or the direction of the stellate veins. The branches of the renal artery radiate in a fan-like manner so that incisions can be made between the larger ones. It is therefore possible to make a transverse incision at a number of places without serious injury to the larger blood vessels and parenchyma.

3. *Enlargement of the pyelotomy wound* by the Eisendrath method has many followers. The elongation of the incision is either carried straight up on the kidney, making a transverse renal incision, or may be angulated so as to expose the calyx containing the stone by joining it with a lateral nephrotomy incision. Marion believes in enlarging the pyelotomy incision depending on the long axis of the stone. He divides the retropelvic artery and doubly ligates it; this, he claims, gives a practically bloodless field which still receives sufficient blood supply from the adjacent arteries and does not do much damage to the kidney parenchyma.

In several of our dogs we have enlarged the pyelotomy incisions toward the lower pole. This gives adequate exposure of all the calyces except the one at the opposite pole.

4. *Incision directly over the calculus* is advocated by numerous writers when there is a single stone definitely and precisely located. The incision is usually made in the avascular area so as to avoid the larger vessels. Some surgeons advise the

insertion of a clamp or scissors through the parenchyma and then by opening the instrument sufficient passageway is made for extraction of the calculus with forceps. Where the kidney tissue is thin or cystic this certainly seems the method of choice.

SUTURING OF THE KIDNEY

Moore and Corbett have emphasized the following facts concerning their experimental work with kidney wounds: (1) operations on the kidney always destroy some kidney substance; (2) sectioning of the kidney did less harm than the suturing necessary to control the hemorrhage; (3) suture of the capsule alone was not sufficient to control hemorrhage and therefore dangerous; (4) the mattress suture placed transversely through the kidney destroys a great deal of kidney substance and the enlargement of the unoperated kidney, a short time after, was due to over-work and not to increase in kidney substance; (5) destruction of the kidney substance extends far beyond the field of operation; (6) the functional activity is somewhat reduced; and (7) interrupted sutures transfixing the kidney at the pyramidal line and tied around the body of the kidney did the least damage and therefore is the method to be recommended.

Apparently from the study of the literature everyone who has done experimental work on suturing of the kidney has improved his own technique by it; but there still seems to be a chaos of ideas as to the methods of suture and the material used. The suturing of a nephrotomy wound aims: (1) to control the hemorrhage; (2) to avoid tissue damage by strangulation or tearing; and (3) to approximate the edges. Some men have advised silk sutures. These might be used with impunity in uninfected kidneys, but I believe that an absorbable suture should be used and it should be one which maintains a good tensile strength until the blood vessels are thoroughly thrombosed. The sutures used in these experiments were No. 00 twenty-day catgut and No. 00 ten-day catgut.

EXPERIMENTAL PROCEDURE

The animals used for experimentation were normal male and female dogs. Phthalein tests were done on most of the animals just before they were operated upon and again just before they were sacrificed. The test was omitted on some of the simpler nephrotomies later in the work because none of the previous animals had shown any variation from normal excretion even when both kidneys had been incised at operation. The dogs were given ¾ grain of morphia fifteen minutes before being anesthetized with ether. The abdomen was shaved and the skin surface was prepared for operation with the iodine technique. Usually a midline incision was made from the xyphoid to the navel. The kidney was approached transperitoneally, freed from its fatty capsule, and easily delivered into the wound. Bleeding was controlled by placing a rubber catheter around the pedicle of the kidney. The incision was then made through the kidney, the pelvis explored and the nephrotomy wound sutured. The abdominal wound was then closed tightly with chromic catgut and a collodion dressing applied. None of the dogs died from loss of blood or infection. They all passed bloody urine for one or two days and then seemed to be normal and remained in good health. The dogs were killed by etherization after a hypodermic of 2 grains of morphia.

After etherization and before death the arteriovenous systems were irrigated with sodium citrate solution through two cannulae, one in each femoral vein, while openings were made in each femoral artery for escape of blood and the citrate solution. After the whole circulatory system had been perfused, the kidneys were carefully removed. They were then washed by way of the arterial channel with acetone, after which the arterial system was injected with a solution of celluloid and camphor at a pressure of 80 mm. of mercury. The venous system was then treated in the same manner at a lower pressure of 40 mm. of mercury.

The kidneys were allowed to remain in water overnight to harden, although the injection set almost immediately after its introduction. The kidney tissue was cor-

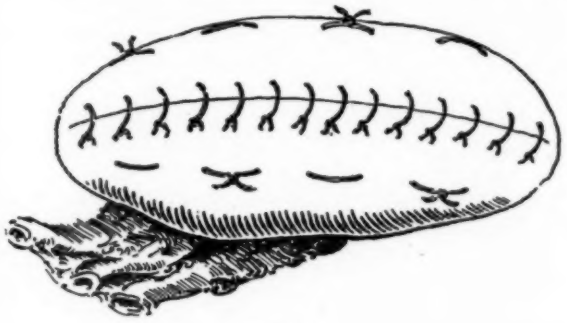

Fig. 1.

roded by the concentrated hydrochloric acid method. The result shows absolute casts of the arterial and venous circulations which can be studied as to size and, with the aid of a binocular microscope, as to the minute vessels and the glomerulae with their efferent vessels.

Each method of incision and suture were repeated six to eight times with uniform results. The specimens presented are the customary ones obtained. Usually both kidneys were operated upon at the same time. Occasionally the same operation was

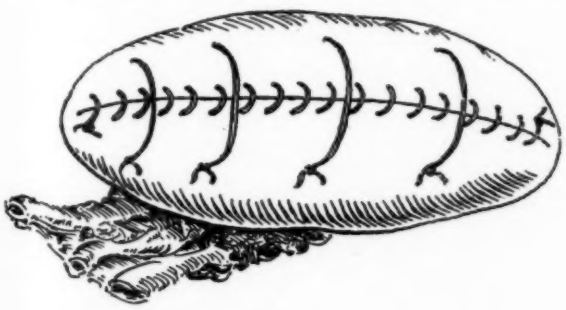

Fig. 2.

done on the two kidneys but more often different incisions with different methods of suture were used to obtain a contrast. More variations were found with various types of sutures than with various incisions, although the same kind of suture material was used throughout. The size of the kidney was noted and also any abnormality in the vessels.

The dog's kidney is subject to many capsular vessels. Several of these kidneys were decapsulated and then allowed to remain one month. The arterial and venous

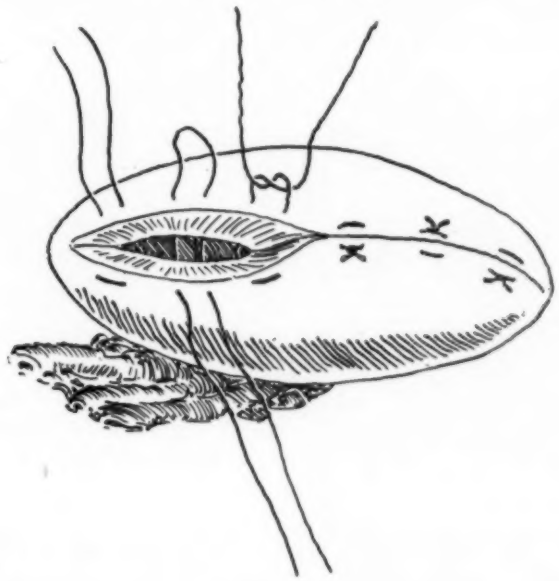

Fig. 3.

systems were not altered, for the corrosion models appeared to be normal.

Complete Longitudinal Incisions and Sutures. (1) The old method of suture of the longitudinal incision employed mattress

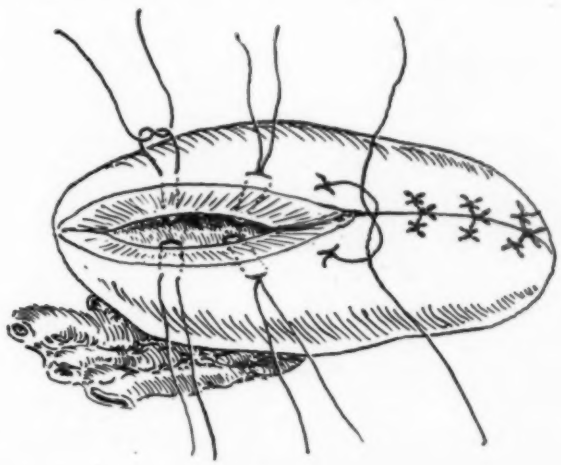

Fig. 4.

sutures (Fig. 1) through the kidney substance, which caused a diminution in the size of the kidney with deep scars in the suture areas. When done on one kidney only, the opposite kidney was noted to be

enlarged. The corrosion specimen was smaller than the opposite one and the blood vessels fewer, although the main arching vessels were present. The glomerulae were much less in number and efferent glomerular arteries less prominent.

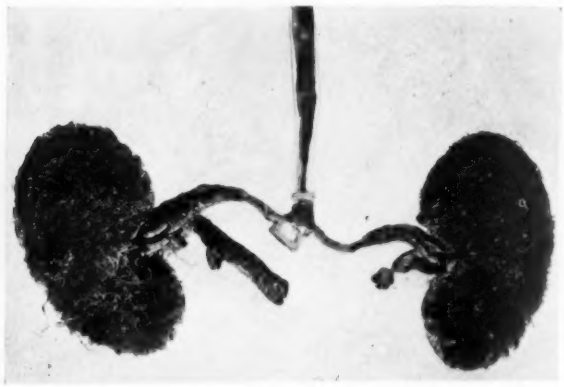

Fig. 5.

(2) When the incision was sutured with deep sutures tied over the convex surface, there seemed to be less destruction of the vessels, although there was some shrinkage in the kidney and scars were seen in the suture bed (Fig. 2).

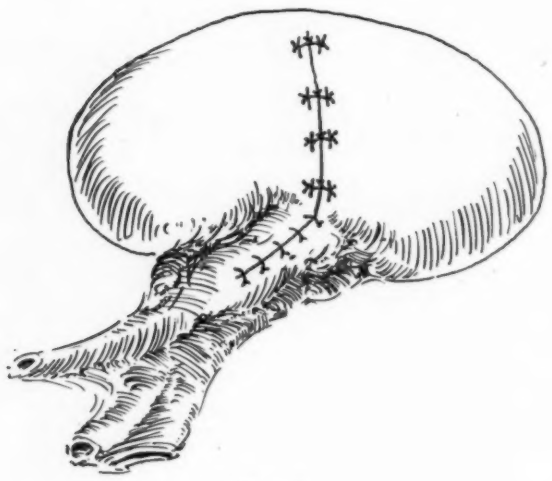

Fig. 6.

(3) The Mayo suture was tried in three cases but the suture did not control the hemorrhage, so that other sutures were necessary. No corrosion specimens were obtained from this method of suture.

(4) Mattress sutures were then tried from the cortex to the pelvis up to the opposite side and back. These controlled bleeding if they did not tear out. The final approximation, however, were not very good (Fig. 3).

(5) The best results were obtained from mattress sutures placed from cortex to pelvis and back, on the same side. About five or six sutures were placed on each side and then tied across to bring about good approximation. In two cases a continuous suture through the capsule was added. This method of suture easily controlled the bleeding so that subsequent sutures were unnecessary. If the sutures were placed 5 mm. from the incision edge much damage was done, in fact, as much as through and through mattress sutures (Fig. 4). When the sutures are placed very near the incision edge, however, and passed just beneath the incision surface, practically no kidney tissue damage is done.

Fig. 7.

Incomplete longitudinal incision in the zone of Hyrtle sutured by this method, cortex to pelvis, apparently does little or no harm. In some of the corrosion specimens a small line could be seen but there was no change in size of the kidney.

Transverse Incision. The corrosion specimens after the transverse incision show variable results. On two occasions the specimens were normal in size and showed only a slight depression in the area of incision. When sutures were placed at some distance or were carelessly placed there was rather marked diminution in the size of the specimen and a deep line in the area of incision. Another point of interest

was noted, that one end of the corrosion specimen was often smaller. When these cases were checked up it was found that there was some difficulty in controlling the bleeding near the pelvis and extra sutures were needed. Apparently some of the anterior or posterior pelvic vessels were cut and when ligated caused added damage to the kidney (Fig. 5).

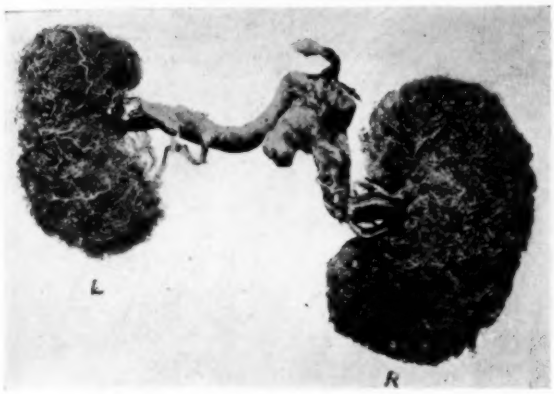

Fig. 8.

Pyelotomy Incisions. When an elongation of the pyelotomy wound is made straight up into the kidney little damage is done (Fig. 6).

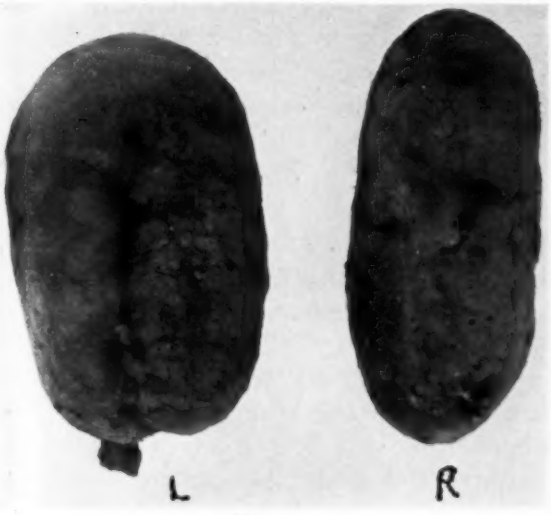

Fig. 9.

Grossly, the kidney when removed is normal in size with convex surface and a linear scar in this region. The corrosion specimen shows only a faint line. Sutures used were mattress from cortex to pelvis. When the incision was angulated as in Figure 7 there was considerable bleeding and the result showed considerable shrinkage of the corrosion specimen and loss of arteriovenous network (Fig. 8L).

Various other experiments were carried out ligating the posterior pelvic artery and vein, with and without the elongations of the pyelotomy incisions. When the vessels were ligated there was a loss in kidney tissue, especially when the artery was ligated. When the vein was ligated a definite area of infarction was found at autopsy. This area could not be injected and all the corrosion specimens showed defects but less marked when the vein was ligated. The kidneys grossly were flat and thin on this side (Figs. 8, 9, 10 and 11R).

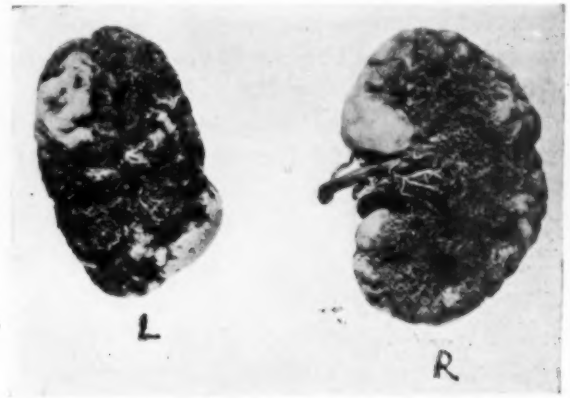

Fig. 10.

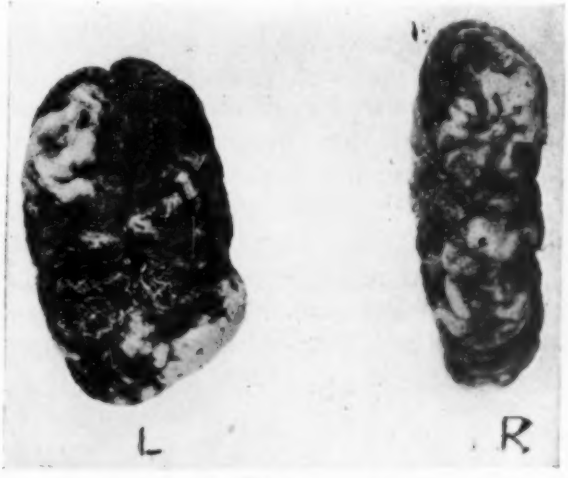

Fig. 11.

The corrosion models indicate marked

damage to the circulation when the retropelvic vessels are cut, but when allowed to remain intact, with elongation of the incision and sutured as recommended, there is very little damage to the kidney circulation. Regeneration of vessels in the area supplied by the retropelvic vessels after they had been severed could not be demonstrated in the corrosion models after a period of three months.

The last type of incision used was one extending down to the lower pole of the kidney. This gave excellent exposure and a free enough opening to remove most large calculi. There was noticeably little bleeding and suture was not difficult (Figs. 12 and 13). The corrosion models show no change in the size of these kidneys; apparently there is no atrophy and the healing is ideal. I have had an opportunity to try this method on one case. Function of the kidney after operation was normal and equal to the opposite kidney.

Fig. 12.

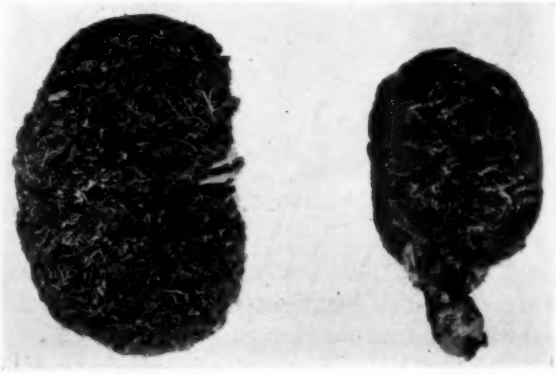

Fig. 13.

DISCUSSION

Several facts of vital interest and of practical value have been observed in these experiments. The corrosion specimen should represent the exact circulation of the kidney as to size, shape and course of the vessels. Little difficulty is encountered in obtaining these specimens if care is taken to perfuse the kidney with citrate and then with acetone before the injection is begun. Kidneys kept in the ice chest over night inject well if the vessels are entirely emptied of blood when removed.

None of the dogs operated upon developed an infection; none bled to death, nor did any develop a urinary fistula or anuria. All wounds were sutured tightly. All the dogs showed a rapid recovery from the operations. Most of them at autopsy showed a few adhesions at the area of incision. The types of incisions used caused little tissue damage and little change in the circulation models. The longitudinal incision along the avascular zone of Hyrtle gives the best exposure to the kidney pelvis. The transverse incision is recommended if the vessels can be avoided either on the anterior or posterior side of the pelvis. The danger of bleeding is greater than with the longitudinal, and if there were a double pelvis this incision would be quite impracticable. The enlarged pyelotomy incision can well be carried vertically on to the kidney if the pelvic vessels are not severed, or it can better be extended to the lower pole in the midline where there are less likely to be vessels of important size. Cutting the retropelvic vessels causes a definite damage to the circulation.

The damage to the kidney in nephrotomies is done by the suture rather than by the incision, unless some of the larger vessels are ligated. Mattress sutures placed through the main kidney substance sufficiently tight to stop bleeding prohibit circulation in a relatively large adjacent

area. Whether these are placed and tied laterally or over the convex border makes very little difference. If they are placed from the cortex to the pelvis only a small area of kidney substance is injured and the control of bleeding is just as efficacious. Greater care should be used in the placement of these sutures. If a pyelotomy cannot be done, a longitudinal incision through the avascular zone of Hyrtle or an elongation of the pyelotomy incision to the lower pole in the midline is the method of choice.

CONCLUSIONS

1. Circulatory changes in the kidney following nephrotomy can be definitely demonstrated by casts of the arteriovenous systems by the injection of celluloid acetone solution.

2. The suture of the kidney is of greater importance than the incision.

3. Ligation of the retropelvic vessels causes renal damage which is not reparable in three months.

4. Bilateral complete nephrotomy can be done with impunity on dogs.

5. The best nephrotomy is the longitudinal through the avascular zone of Hyrtle.

6. The best method of elongating a pyelotomy wound is to the lower pole in the midline.

7. The suture recommended is the cortex-pelvic mattress suture of No. 00 chromic catgut.

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THE DIAGNOSIS OF NEW GROWTHS OF THE COLON*

MAURICE KAHN, M.D., F.A.C.S.

LOS ANGELES

THE reason for considering neoplasms of the colon is the unsatisfactory end results observed in cancer cases. The explanation is at once evident. First, at least 35 per cent of colonic cancer cases are inoperable when they reach the surgeon. These are of course doomed; also 85 per cent of the remaining 65 per cent reach the operating table too late for a cure. Not more than 10 per cent of the total number encountered are alive five years later, even with the most extensive operation.

The benign tumors, relatively rare, are adenoma, lipoma, fibroma, myoma, papilloma, and angioma. Some of these may be polypoid. Adenoma is the commonest form and may be single or multiple.

The malignant tumors are sarcoma and carcinoma. Sarcoma is rare, while carcinoma is the most common of all colonic tumors.

Because some other diseases of the colon present symptoms similar to those of neoplasm, it becomes necessary to mention them also for the purpose of differentiation. They are tuberculosis, chiefly of the ileocecal coil, tuberculous peritonitis, enlarged mesenteric glands, intussusception, diverticulitis, and rarely appendicitis.

The symptoms of neoplasm are constipation, diarrhoea, constipation alternating with diarrhoea, bloody or blood stained stools or occult blood, tenesmus, when at stool a feeling of incomplete emptying of the bowel, belching, nausea, vomiting, abdominal pain, cramplike in character, abdominal discomfort with rumbling of gas, meteorism, tumor, cachexia, visible peristalsis, and fever.

Constipation or constipation alternating with diarrhoea should occur only in those cases where the tumor partially obstructs the lumen of the gut, hence any tumor of sufficient size may present this symptom. Diarrhoea alone would be more likely to occur in the irritating type of growth, not in the obstructive type. Bloody or blood stained stools may arise from any vascular tumor, ulceration, or from marked congestion. This symptom appears in 34 per cent of carcinomata whether of the mass tumor type or of the annular variety. It occurs also in angioma, papilloma, and adenoma; also in intussusception, tuberculous ulceration, dysenteric conditions, etc. Belching is a pretty constant symptom of various abdominal conditions so has little differential value, but is important as it is at times the outstanding symptom of rectal pathology.

Nausea and vomiting occur in 50 per cent of the cancer cases. They are most apt to occur in the presence of those tumors large enough to cause temporary or permanent occlusion of the lumen of the gut, and are of great value in the diagnosis of obstruction. Cramplike pain is due to violent peristalsis, nature's effort to force the intestinal contents through a narrowed lumen. It occurs in 75 per cent of cancer cases. It is a valuable sign of obstruction. The milder sort of pain, more of a discomfort which comes and goes, is frequently found in the smaller tumors, and while of no differential value, may prove of tremendous value if it lead to a thorough examination which may disclose a young cancer. Meteorism, cachexia, and visible peristalsis are usually late manifestations of malignant disease. Anemia is usually a late symptom of cancer also, but may occur in a mild degree relatively early. It is well to

* Read as a part of a symposium on New Growths of the Colon, before the Los Angeles Surgical Society.

think of the possibility of cancer of the colon in an otherwise unexplained secondary anemia. A palpable tumor is also a late symptom. A low fever in the presence of a neoplasm usually results from absorption from an ulcerated area or copraemia. Tenesmus is apt to be marked in the low lying growths, those of the rectum or sigmoid, but also occurs in intussusception.

Tuberculosis of the cecum or ileocecal coil may easily simulate neoplasm of the cecum. If it be secondary to tuberculosis of the lung, an erroneous diagnosis is not likely, as the history, night sweats and evening rise of temperature, would lead one aright. If it be primary, the differentiation may not be possible, though tuberculosis is apt to occur in young individuals whereas the most common neoplasm of the cecum, cancer, occurs usually after forty. Enlarged mesenteric glands have been mistaken for tumor of the bowel but with the present perfected technique of our roentgenologists, the roentgenogram should differentiate these two conditions. Diverticulitis may occur anywhere in the alimentary canal, but is usually in the left colon. It has been mistaken for tumor, particularly cancer. I once committed this error even after the abdomen was open. I operated on a woman of forty with a diagnosis of appendicitis. On opening the abdomen I found a mass involving the upper portion of the ascending colon and its mesentery, with enlarged glands. Believing it to be a carcinoma, I did a resection, removing glands and all, in one piece. The patient recovered. On examining the specimen later it was found to be a case of diverticulitis with perforation between the leaves of the mesentery.

Intussusception occurs usually in children and will not often be mistaken for a neoplasm. When it occurs in the adult it is frequently caused by a new growth, not only a pedicled tumor which has a way of dragging its segment of gut into the adjacent lower segment, but also by the sessile tumor which excites an active localized contraction thus favoring and frequently causing telescoping. Therefore, when intussusception is encountered in the adult it is always wise to make diligent search for a tumor which is usually the etiologic factor.

The purpose of considering the symptoms of neoplasms of the colon, and of enumerating the various kinds of tumor that may be found there, is to emphasize the frequency of cancer and to urge its earlier recognition.

Surgeons have always complained that they get their cancer cases too late, and they are right. Cases do get to the surgeon too late. But who is to blame and how may the situation be improved? I believe that the insidiousness of the disease itself is largely responsible. We have all seen patients who have consulted a physician for the first time after the advent of complete obstruction due to cancer. We have all seen many patients who have consulted a physician for the first time after the symptoms of partial obstruction had existed for months, but the symptoms were so mild that only a hypochondriac would have consulted a doctor. In such cases the silent development of the disease is responsible. Then there is another group of patients whose histories reveal the existence of suggestive symptoms for months. Many patients make light of these early manifestations and do not consult a doctor, but treat themselves or stray to one of the numerous cults. In this group the patients themselves are responsible. Another group of patients have consulted doctors who have failed to properly interpret the complaints, and neglected to make a thorough examination which would probably have disclosed the disease in its earlier stages. It is fashionable to censure the medical men for failure to recognize these early cases, but I can understand how this might occur. The general practitioner sees so many cases of simple, benign, abdominal diseases causing intestinal disturbances that it is not surprising that the more uncommon cancer of the colon which he sees but rarely is not always thought of. This explains but does not excuse dereliction.

When a patient of cancer age shows unusual disturbance of bowel function lasting more than a few days it should arouse the attending man's curiosity enough to prompt an investigation. There is never an excuse for overlooking tumors of the rectum where feeling and seeing the parts are so easy. In this connection it may be stated that no examination is complete that does not include roentgenogram study, our most valuable aid in differentiating intestinal pathology above the rectum. In our office we have learned to place great reliance on the roentgenogram when interpreted by an expert roentgenologist, and feel that it is indispensable in the diagnosis and location of intestinal neoplasms. It is important that we have constantly in mind the symptoms of cancer of the colon, and that we indict every person over forty who presents suspicious symptoms and subject him to the most thorough and complete examination. This and education of the public offer the only hope of our getting cancer patients early enough to effect a cure in a reasonable percentage of cases.

CASE REPORTS

SOLITARY KIDNEY WITH ARTIFICIAL URETER*

ABRAHAM HYMAN, M.D.

NEW YORK

THE patient, a young woman of twenty-six years of age, was admitted to Mount Sinai Hospital on August 16th, 1924, with the following history:

She has had pain in the left loin radiating downwards for the past five years. These attacks are becoming more frequent of late, lasting about one hour and accompanied by frequency, dysuria, nocturia, nausea and vomiting. She has been married four years and had one miscarriage a few years ago. Two years ago she was operated upon at another hospital and a bicornate uterus was found, the left horn with the tube and ovary being amputated. There was no investigation of the urinary tract made at the time.

Physical examination shows a patient in fairly good condition. Neither kidney is palpable or tender. On vaginal examination an irregular, stony, hard, fixed mass about the size of an orange is felt in the cul-de-sac. It gives one the impression of either a calculus or a malignant growth. A roentgenogram of the urinary tract shows a giant calculus in the left ureter. This calculus is about 4 inches in length and the thickness of the thumb.

Cystoscopy showed an injected bladder with edema of the left meatus. The ureteral catheter was obstructed at the orifice and could not be passed beyond this point. The right ureteral orifice could not be found, after a very intensive search. No blue appeared from either side within fifty minutes after injection. The catheterized urine was cloudy, and showed pus and red blood cells. The phenolsulphonephthalein test was 15 per cent in two hours; the blood chemistry was only slightly elevated. At another cystoscopy a few days later, it was impossible to find a right ureteral orifice, and a diagnosis was then made of ureteral calculus with congenital single kidney.

Operation, August 22, 1924. Left ureterotomy and drainage for ureteral calculus. Though a pararectal incision the left ureter was exposed extraperitoneally. The ureter was found markedly dilated, adherent, and the walls thinned out. An incision was made over the stone and a large calculus extracted in two segments. One fairly large piece remained wedged in the lower end of the ureter, and could not be dislodged.

The condition of the patient did not warrant any further attempts at removal of the remaining fragment, and a drainage tube was inserted into the ureter and brought out through the lower angle of the wound. Following this operation, all the urine drained through the tube in the left kidney, and there was no urine found at any time in the bladder, thus verifying the absence of the right kidney. Indigocarmin was injected and did not appear in the urine until five days after operation.

On September 3, 1924, the patient was again operated, a vaginal ureterotomy being done for the stone impacted in the lower end of the ureter. The stone was readily removed in this way. A few weeks after operation, it was found impossible on a few occasions to catheterize the left ureteral orifice, obstruction being encountered at a few centimeters' distance. After removing the tube from the left ureter, all the urine drained out through the sinus, none being voided by the patient. This condition continued until October 22nd, when it was decided to expose the lower end of the ureter and determine the exact state of affairs.

Operation, October 22, 1924. Suprapubic cystotomy and establishment of ureterovesical anastomosis for ureteral fistula.

A bougie was passed into the ureter through the fistula. An incision was then made, excising the old scar and exposing the ureter. The ureter was found densely imbedded in surrounding tissues which were all baked together rendering it impossible to mobilize the ureter which was thinned out and friable. The lower

* Read before Section of Genito-Urinary Surgery, New York Academy of Medicine, Dec. 21, 1927.

end of the ureter was traced downwards where it was found to be entirely occluded. The bladder was then opened and the left ureteral orifice was probed. The bougie could be passed only for a few centimeters. This end of the ureter was also closed off and a gap of about three-fourths inch between both ends of the ureter was present; this portion of the ureter had evidently sloughed away.

Since it was impossible to mobilize the ureter so as to make a new anastomosis with the bladder, the bladder was partially mobilized and brought up to the lower end of the proximal ureter. A hole was then punched in the bladder wall and a drainage tube passed through it into the ureter, after opening up the closed off ends of the ureter. During this procedure the peritoneum was opened in a few places but immediately closed. The bladder was closed with two layers of sutures, and the ureter tube was brought out through the upper angle of the incision. A small suprapubic tube was inserted and kept in place for about three weeks. The tube in the ureter was removed about a week after this.

For a while urine naturally drained through the suprapubic sinus. After its closure the patient voided for the first time per via naturalis. This continued for about four weeks. Less and less urine was then voided, and more and more appeared through the ureterotomy sinus in the abdominal wall. A cystoscopic examination at that time demonstrated that the artificial anastomosis had contracted considerably, just allowing the passage of a No. 5 catheter. The ureter was gradually dilated up to the large Garceau catheter, after which the patient again voided all of her urine. This state of affairs continued for a few months, the anastomosis always showing a tendency to re-contract. It was then found that there were evidences of retention and infection in the left kidney, and in order to remove the strain from this organ it was decided to do a lumbar ureterostomy.

Fig. 1. Ureteral calculus in ureter of solitary kidney.

Fig. 2. Artificial ureter employing a Pezzer catheter.

Through a lumbar incision the kidney was exposed and the pelvis and ureter found markedly dilated. An incision was made just below the ureteropelvic junction and a tube placed through the ureter into the pelvis. The problem which confronted us was how to maintain a patulous anastomosis. For this purpose we had special Pyrex glass tubes made, the size being about No. 15 Fr., approximately an inch long. These were passed by means of strings into the anastomotic opening and kept in place for weeks at a time. By clamping the ureterostomy tube, it was found

that the patient voided all of her urine through the urethra. This state of affairs continued for a number of months until the patient had a very severe hemorrhage, evidently due to an erosion of a blood vessel by the glass tube. This form of dilatation was then discontinued. After months of such dilatation by glass tubes, it was found that after discontinuing it the anastomosis again re-contracted. We then decided upon the use of a large Pezzer catheter, which has proved very satisfactory for the past few years. The patient returns to the hospital about once every seven weeks to have a fresh catheter inserted. The technique of changing this catheter is as follows:

A heavy silk thread, about 10 or 12 inches long, is attached to the end of the catheter which projects from the lumbar sinus. A cystoscope is then introduced, and alongside it a heavy dressing forceps which grasps the bulb of the catheter. The catheter is then withdrawn through the urethra. A fresh catheter is then tied onto the lower end of the string and this is pulled up through the urethra into the bladder so that the bulb lies snugly against the ureteral orifice. The catheter, of course, has a number of perforations to allow of drainage through it from the kidney.

About a year and one-half ago she went through a normal pregnancy without any unusual complications. She retains her urine from two to three hours during the day, and voids once or twice by night. By means of this catheter she is enabled to irrigate the bladder whenever necessary, by opening up the tube which projects from the lumbar sinus and inserting the nozzle of a syringe. We anticipate removing the tube sometime in the near future with the hope that this continuous dilatation for a number of years may have served to establish an anastomosis which will not re-contract.

BILATERAL DOUBLE PELVES AND DOUBLE URETERS*

RIGHT NEPHRECTOMY AND LEFT HEMINEPHRECTOMY

ABRAHAM HYMAN, M.D.

NEW YORK

THE patient, a male twenty-eight years of age, was admitted to the hospital in January, 1922. Past history: He had been complaining of pain in the back and frequent urination for two years. Present illness: The above symptoms have been increasing in severity of late, and the patient has noticed that his urine was turbid. Physical examination showed a young man in good condition. Neither kidney was palpable or tender. The roentgenogram of the genitourinary tract was negative. The urine was cloudy, containing large amounts of pus. The phenolsulphenophthalein test was 40 per cent; blood chemistry normal; the Wassermann negative. Cystoscopic examination showed an inflamed bladder. The right ureteral orifice was considerably retracted, and an impassable obstruction encountered at 15 cm. No flow of urine or indigocarmin was obtained from this side. The left ureteral orifice, which was normal in appearance, was catheterized and clear urine obtained, with good indigocarmin within 15 minutes. At the time the first cystoscopy was done, it was not noticed that there were two extra ureteral orifices. A diagnosis of right sided infected hydronephrosis was made, and the patient operated.

At operation it was discovered that there was a double pelvis with two ureters. The kidney was found atrophic and hydronephrotic. In view of the fact that there was practically no kidney tissue left, a nephroureterectomy was done, removing the kidney and ureters in one piece down to within an inch of the bladder. This necessitated an anterior extraperitoneal incision. After operation the patient's urine was perfectly clear for about a week, when it suddenly became turbid. In view of the findings on the right side, a similar condition was suspected on the left.

* Read before Section of Genito-Urinary Surgery, New York Academy of Medicine, Dec. 21, 1927.

The patient did not return again until October, 1927. In the interval he had been fairly well except for attacks of pain in the left lumbar region with moderate frequency of urination. The urine has been increasing in turbidity and the patient finally consented to undergo a second cystoscopic examination. This showed an inflamed bladder. There were two ureteral orifices seen on the right side. These could only be catheterized a short distance. The ureteral orifice on the left side was considerably swollen. Above and to the outer side of the ureter there was an inflamed, edematous area which appeared to be a second ureteral orifice. This orifice, however, could not be catheterized, and no indigocarmin was observed coming down. The normally placed left ureteral orifice was catheterized to the pelvis and clear urine obtained, with strong indigocarmin. The catheterized specimens showed occasional pus cells. At a third cystoscopy the same findings were observed, it being impossible to catheterize the second orifice. A diagnosis was made of double kidney and double ureters, with infection of the lower pelvis and ureter.

Operation, October 14, 1927. A left lumbar incision exposed a double kidney, the upper half represented by normal, solid looking parenchyma. The lower half was hydronephrotic. The kidney was somewhat contracted in the middle at the point of fusion of the upper and lower halves. The ureter coming from the upper half of the kidney was normal in size and appearance; that from the hydronephrotic part of the kidney was considerably dilated. Fortunately, the main blood supply entered the upper half of the kidney. A heminephrectomy was done, with removal of the dilated ureter as far down as could be reached through the lumbar incision. The bleeding was controlled by means of mattress sutures.

The day following operation the patient passed only a few ounces of urine, and for the succeeding twenty-four hours the output was about four ounces. The patient then became stuporous, although he could be aroused. The blood chemistry, which prior to operation showed an urea of 23, now rose to 32, and we were at first under the impression that he was suffering from uremia. The urinary output steadily increased, however, under diureses. This peculiar stupor lasted for about three days and then entirely cleared up, the condition evidently being a postoperative psychosis. Despite the fact that his urinary output increased steadily, his blood chemistry mounted, the urea reaching as high as 73 mgm. a few weeks after operation. A considerable collection of pus was found in the wound. After thorough drainage his general condition gradually improved and the urea dropped down to 49 mgm.

His condition now is very good. The urine is slightly cloudy, the wound is firmly healed. It may be necessary at some future time to remove the lower segment of the ureter, if the pyuria does not clear up completely.

MASSIVE HEMATURIA COMPLICATING PYELONEPHRITIS*

ABRAHAM HYMAN, M.D.

NEW YORK

IT is not generally recognized that pyelonephritis may be the cause of a massive hematuria. We have observed two such cases during the past few years which seem worth while reporting.

A male forty-two years of age entered the hospital in April, 1926, with a history of intermittent attacks of pain in the right loin of three years' duration. For the past year the pain has been more constant, radiated downwards, and is accompanied by frequent urination. He has been subject to recurrent attacks of colds, and with each attack there was an exacerbation of the urinary symptoms. For the past seven months he has complained of pain in the left loin, weakness, loss of weight, headaches and nausea, and occasional chilly sensations with slight fever.

Physical examination showed an anemic, thin individual who looked acutely ill. The

* Read before Section of Genito-Urinary Surgery, New York Academy of Medicine, Dec. 21, 1927.

urine was cloudy, acid, with a specific gravity of 1018, and contained considerable amounts of pus. There was fairly marked right costovertebral tenderness. Roentgenogram of the genitourinary tract was negative for calculus, and the blood chemistry was practically normal.

Cystoscopic examination showed an inflamed bladder with numerous cystic lesions resembling cystitis cystica. Both ureters were catheterized, no obstruction being encountered on either side. Indigo carmin appeared from both kidneys within ten minutes, and the catheterized specimens from both sides showed pus, the cultures of which were sterile. Numerous smears examined for tubercle bacilli were negative. A cystogram showed a moderately trabeculated bladder with no evidences of a reflux. Under rest in bed and diureses the patient's condition improved and he was discharged from the hospital after a month.

The patient returned to the hospital in June, 1926, with practically the same symptoms, increasing in severity during the past month. A cystoscopic examination demonstrated the same findings, cloudy urine being obtained from both kidneys. The function of the left kidney was somewhat better than the right. About a week after the cystoscopy he developed a very profuse hematuria which lasted a few days. Cystoscopy showed that the blood came from the right kidney, clear urine being obtained from the left side. During this time he had chills and fever. A pyelogram of the right kidney showed dilation of the pelvis and calices. The phenolsulphenophthalein test was 20 per cent. He then developed very marked left costovertebral tenderness, and a temperature fluctuating between 103 and 105 degrees. Despite an indwelling catheter in his left kidney the temperature did not recede, and a diagnosis was made of a possible left perinephric abscess.

On July 7th the left kidney was exposed, no evidence of a perinephric abscess being found. The kidney was twice its normal size, and on decapsulation revealed multiple small foci of suppuration. The kidney was opened bluntly and the dilated pelvis and calices explored, with negative findings. A tube was then inserted, and the patient drained for a number of weeks. At this time the cultures from both kidneys showed a pyocyaneus infection. Tubercle bacilli were repeatedly sought after but never found. The patient's condition gradually improved and he was discharged a few months after entering the hospital.

He entered the hospital again in October, 1916, with a history of fever, chills, and pain in both kidney regions. This condition lasted for about ten days, and then the temperature dropped to normal.

In February, 1927, he again returned with pain in the left loin. A cystoscopic examination demonstrated a bilateral pyuria with evidences of retention in the right pelvis. Cultures showed pyocyaneus bacilli in both kidneys.

In recapitulation of his treatment during all this time, it may be stated that he had pelvic lavages with mercurochrome and silver nitrate, autogenous vaccines and intrapelvic injections of pyocyaneus vaccines, besides internal antiseptics, including caprikol and methenamine.

Although his general condition has improved somewhat, there has been no change in the local condition, the urine still being turbid and containing large amounts of pus, with a pyocyaneus culture from both kidneys.

The second case, a male fifty-one years of age, was first examined in February, 1927. This patient's history dates back eighteen years when he first contracted bladder and kidney trouble, for which he consulted innumerable physicians. A diagnosis at the time was made of left pyelonephritis. For years he suffered from frequent attacks of pyuria, with severe hematurias, fever and chills and pain in both kidneys. He has had all forms of treatment, including a perineal operation and suprapubic drainage. About ten years ago his left kidney was removed and was found to be a site of a chronic pyelonephritis. Since this operation he has had frequent attacks of pain in the right kidney, fever, chills and massive hematurias lasting from one week to ten days.

Physical examination showed a man in fairly good general condition. He had just recovered from one of these acute attacks of pyelonephritis, and there was still some tenderness present in the right loin. A cystoscopic examination showed a thickened and inflamed mucosa with slight intraurethral and intravesical prostatic adenoma. The residual urine was one-half ounce. The right meatus was swollen. Catheterization of the ureter to the pelvis was made without encountering obstruction. The capacity of this kidney was 8 cc. Urine obtained from the right kidney was

cloudy and contained numerous pus cells in clumps. Indigo carmin appeared in poor concentration four minutes after intravenous injection. The culture from the right kidney and bladder specimens showed a pure growth of colon bacilli. A roentgenogram of the genitourinary tract demonstrated the right kidney to be about twice the normal size. No calculi were seen. We did not consider it advisable to take a pyelogram of this kidney.

Since February the patient has had at least one-half dozen acute attacks of pyelonephritis. During two of these attacks he has had massive hematurias, the last about a month ago at which time the bleeding continued for four days. During these attacks he has fever and chills. He has had bladder and kidney lavages and internal medication with but slight improvement in the local condition. For a period of about two months he was given a colon bacillus Phage lavage of his pelvis twice a week. Some of these lavages were followed by a marked reaction which manifested itself within a few minutes after the injection. For days after such a reaction, the urine was remarkably clear and we looked forward hopefully to a cure of this condition. Since the Phage treatment was discontinued, however, the urine has resumed its same cloudy appearance, and we realize that the effect of the treatments was only transitory.

ECTOPIC SUPERNUMERARY URETER OPENING INTO THE VAGINA*

PARTIAL RESECTION OF KIDNEY AND URETER

ABRAHAM HYMAN, M.D.

NEW YORK

THE patient, a female sixteen years of age, has since early childhood had constant dribbling of urine by day and night. There has never been a period when this has ceased. She voids normally four or five times during the day. Her general health has always been excellent. She has been examined on a number of occasions, and treated for a nervous form of enuresis.

Physical examination shows a well developed, healthy girl. There is considerable excoriation of the labia and the inner aspect of the thighs, the result of constant dribbling of urine. A first inspection of the vaginal outlet was negative. A catheter was then passed into the bladder and some 8 ounces of clear urine withdrawn. A pledget of cotton was then placed in the vaginal orifice; about ten minutes later this pledget was soaked. The bladder was then filled with an indigo carmin solution, and another pledget inserted and removed ten minutes later. It was found soaked with urine, but colorless, thus demonstrating that it was not a vesicovaginal fistula. By means of a strong light and a speculum, a tiny opening was revealed on the anterior vaginal wall, just behind the external meatus. Drops of urine were seen coming from this orifice. Attempts to probe the orifice with fine catheters or bougies were negative, an obstruction being encountered at about 1 cm. distance. A diagnosis was made at this time of ectopic ureter opening into the vagina.

At the next examination the patient was cystoscoped and a normal bladder and ureteral orifices revealed. Both ureters were catheterized to pelvis and clear urine was obtained, with good equal function as determined by indigo carmin. The urine from the third ureter contained no blue after thirty minutes, and was of a pale, watery consistency. The catheterized specimens from the two normally placed ureters contained 1.2 per cent urea; that from the ectopic ureter showed 0.2 per cent urea. A roentgenogram of the urinary tract was negative. A film taken with two opaque catheters in situ showed a normal position of both kidneys. The ureteral orifice in the vagina was then injected with iodid by means of a large syringe with a conical tip.

* Read before Section of Genito-Urinary Surgery, New York Academy of Medicine, Dec. 21, 1927.

After about 30 cc. had been introduced, the patient complained of pain in the left loin. A roentgenogram then taken showed a considerably dilated ureter, ending in a small pelvis in the region of the left kidney. A pyelogram of the left pelvis showed a normal outline, and was in close proximity to the pelvis communicating with the third ureter.

Operation, September, 1927. A left lumbar incision was made, exposing a normal sized kidney with an accessory ureter coming off the upper pole of the kidney. This ureter was markedly dilated all the way down to the pelvis. The normal pelvis was situated in the middle of the kidney and was not dilated. A careful examination of the blood vessels was made and it was found that the vessels entered the kidney in their normal relation, with the exception of a large branch of the renal vein which entered the upper pole of the kidney behind the ureter.

Procedure: It was determined to resect the upper pole of the kidney. The ureter was opened, and a finger introduced into the pelvis to demarcate its outline. The upper pole of the kidney was then resected, after ligating the branch of the renal vein above mentioned. The ureter was freed as far down in the pelvis as could be reached through a lumbar incision, cut across, and the stump carbolized. The upper pole of the kidney was closed with mattress sutures, using fat implants, and the wound closed in layer suture, with rubber dam drain.

The dribbling stopped immediately after operation. The patient made an uneventful convalescence and was discharged from the hospital within three weeks after operation. A control cystoscopy on November 14th (about two months after operation) showed that indigo carmin appeared in equal concentration from both kidneys within a few minutes after intravenous injection, and that there were no evidences of retention of urine in the left kidney.

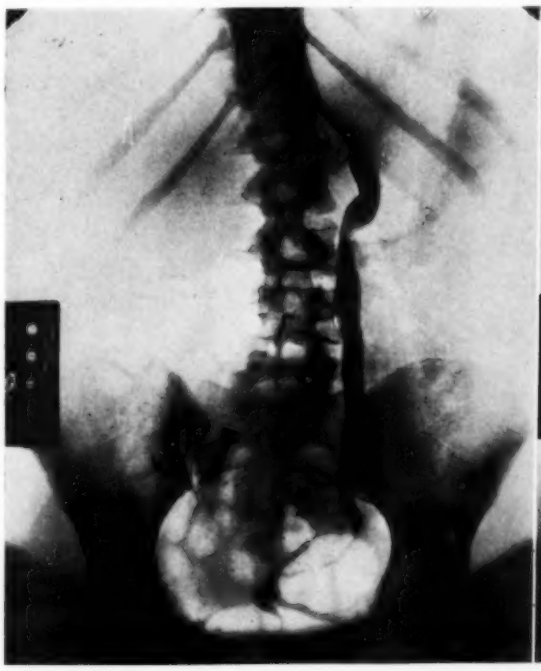

Fig. 1. Pyelogram of supernumerary ureter.

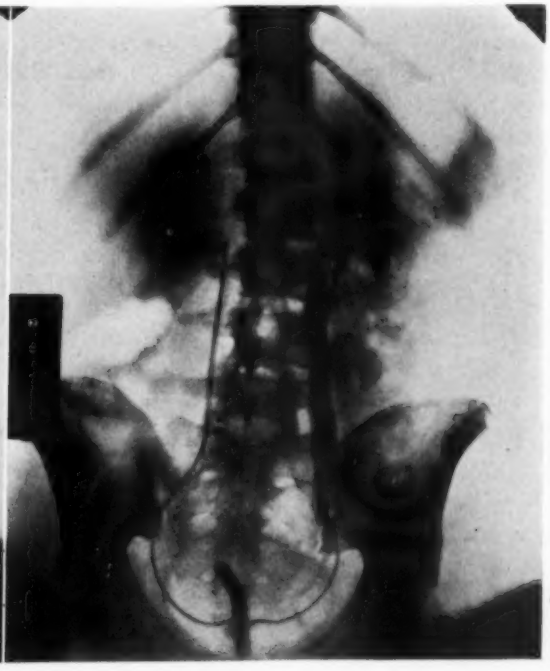

Fig. 2. Pyelogram showing normal pelvis and supernumerary ureter and pelvis.

Up to date there have been reported in the literature 103 cases of this type of anomaly.

Dr. H. Dawson Furniss. It has been my good fortune to have three cases of extravesical ureter. In determining the condition the bladder is filled with indigo carmine or methylene blue solution, and phenolsulphonephthalein injected intravenously. If the leakage is vesical a blue stained fluid is obtained; if the urine discharge is through an extravesical ureter, phenolsulphonephthalein is obtained, provided there is enough functionally active renal tissue connected with the ureter to eliminate the dye. Unfortunately, many are unable to excrete the dye. In some instances a pyelogram on the involved side will show

an absence of the upper calyx. In two of mine the pyelogram was that of a normal kidney. In the case presented by Dr. Hyman there is an absence of the upper calyx in the pyelogram made through the intravesical ureter. In my first case I did an implantation of the ureter into the bladder per vaginum, and seven years later resected the part of the kidney drained by this ureter. The resection is the preferable method unless a large amount of kidney tissue is drained by the ureter and there is no infection. Usually the ureter and the pelvis are dilated and there is infection and pressure atrophy of the renal tissue. It is not only useless but positively harmful to drain such a ureter into the bladder. One of my patients had the condition on both sides. Kilbane's statistics of 101 cases collected from the literature show this occurs in 4 per cent.

With a history of constant urinary leakage since birth, and normal voiding, one should search for an extravesical ureter; it will be present; the difficulty is to find it.

FRACTURES OF BOTH FEMURA AND LEFT ELBOW FOLLOWED BY ANURIA*

DECAPSULATION AND RECOVERY

Abraham Hyman, M.D.

NEW YORK

A BOY ten years of age was admitted to Mount Sinai Hospital, March 25, 1927, with a history of an automobile injury a few hours previously, following which he was unable to stand on his legs.

Physical Examination. Shows a well developed boy of ten years. Chest and abdomen negative. Examination of lower extremities reveals a fracture of both femura about the middle of the shaft, with marked deformity and eversion of both legs. There is also considerable swelling, ecchymosis and crepitus around the left elbow joint.

The roentgenogram examination revealed a fracture of both thighs in the middle third with displacement of the distal fragments mesially. The left elbow region showed a fracture through the lower end of the humerus with displacement outwards of the lower fragment and also fracture of the internal condyle. The urine on admission was clear, acid, showed a faint trace of albumen, and contained scattered white blood cells without any casts. Under open ether anesthesia the fractures of the femora were reduced under fluoroscopic control, and a large plaster of Paris spica cast was applied. A roentgenogram taken the following day demonstrated that there was still some displacement of the fragments, and the cast was accordingly removed and on March thirtieth another cast applied. For this purpose a second anesthetic was administered. Both thighs were put up in abduction with partial flexion of the knee joints. The elbow was put up in flexion with a light cast.

From the time of his admission on March 25th until April 4th the patient passed normal amounts of urine which showed a faint trace of albumen, with a specific gravity of 1012; on one occasion a few granular casts were found. On April 4th there were two attacks of macroscopic hematuria. An examination of the fundi at this time showed them normal; the blood pressure was 150/100. On April 5th the patient stopped voiding, and catheterization yielded only 10 cc. of bloody urine. The next day the urinary output ceased entirely, vomiting ensued, the pulse became rapid and of very high tension, and the blood chemistry examination showed an urea of 67, nitrogen 113, uric acid 8.6 and creatin 3.1. The urine was loaded with red blood cells, and occasional white blood cell and hyaline and granular casts. Our impression at the time was that the boy

* Read before Section of Surgery, New York Academy of Medicine, Feb. 3, 1928.

was suffering with an acute exascerbation of an old nephritis with urinary suppression and evidences of uremia.

Despite medication and diuresis there was absolutely no urinary output, and on the third day of his anuria, in view of the high blood chemistry and the clinical evidences of uremia, it was decided to do a decapsulation. Under gas and oxygen anesthesia both kidneys were exposed. The kidneys were not engorged or glaucomatous; if anything, they were paler than a normal kidney. Both kidneys were decapsulated and a small section of kidney parenchyma removed for histological examination.

The morning after operation a blood chemistry examination showed that the figures had mounted, the urea being 82, nitrogen 131, uric acid 10, and creatin 3.4, with a CO_2 of 53. Within twenty-four hours following the operation the patient voided 5 ounces of urine. The next day the urinary output increased to 24 ounces and there was profuse urinary drainage from both lumbar incisions which had been drained. The histological report on the specimen of kidney parenchyma removed was "slight tubular degeneration with cloudy swelling."

The urinary output steadily increased to 42 ounces at the end of the third postoperative day, the nausea disappeared and the vomiting ceased. The blood pressure dropped from 150/100 to 115/65, and the blood chemistry figures gradually returned to normal. The wounds healed kindly, the urinary leakage ceasing within ten days. From this time on the convalescence was uneventful. The plaster cast was removed from the thighs in the seventh week and the mobilization of the elbow was begun within a few weeks after the injury. The patient was discharged from the hospital June 13, 1927, in excellent condition. He was last seen early in January, 1928. He walks without any apparent limp, and the function of the left elbow joint is very satisfactory. The urinary examination a few days ago showed a normal specimen.

RECURRENT VOLVULUS OF THE SIGMOID*

Abraham Hyman, M.D.

NEW YORK

THE patient, a young woman twenty-two years of age, was admitted to Mount Sinai Hospital February 19, 1924, with a two days' history of general abdominal cramps, weakness, and prostration. There had been no bowel movement for the previous five days, during which time some flatus was expelled. The abdominal cramps were increasing in severity, were more marked in the right lower quadrant than in the epigastrium; castor oil and enemas had been ineffectual, and vomiting ensued on the day of admission.

Past History. Appendectomy three years ago. Since this operation she has had a number of attacks of rather severe abdominal pain, and has been suffering from fairly marked constipation.

Physical Examination. Shows a young woman who is suffering severely with abdominal cramps. The abdomen is considerably distended, the distention being more marked on both sides of the abdomen with a groove in the midline. There is general abdominal tenderness with some rigidity. The blood chemistry and urinalysis were normal. A diagnosis was made of intestinal obstruction, probably due to a volvulus, and the patient was operated on February 19th, 1924.

A ten inch right rectus incision was made. On opening the peritoneum considerable free fluid was evacuated. A tremendous distention of the sigmoid was found, which was due to a volvulus of the sigmoid mesentary. The two loops of the distended sigmoid were each the size of an adult thigh, and ran almost parallel with each other, extending from the pelvis to the diaphragm. The gut was very tense but viable. A puncture was made through the lower end of the volvulus, and a large amount of fluid feces and gas evacuated, and the opening closed with Pagenstecher. The volvulus was then untwisted, and a tube inserted per anus

* Read before Section of Surgery, New York Academy of Medicine, Feb. 3, 1928.

in the sigmoid past the obstruction, and five basins of fluid feces and castor oil contents were removed. This was followed by an immediate collapse of the large gut. The abdomen was closed in layer suture.

A few days following operation, the urea in the blood was 35, and the nitrogen 34. Except for a wound infection which was rather stubborn, her convalescence was uninterrupted. The patient was discharged from the Hospital on March 3rd, 1924. A barium enema on March 26th showed a narrowing of the sigmoid above the level of the horizontal ramus of the pubis. The barium, however, passed freely beyond this area. One loop of the sigmoid was drawn far to the right, and apparently fixed. The narrowing of the colon was apparently due to adhesions; otherwise the colon was negative.

The patient was well until September 2nd, 1924, (six months), when she returned to the Hospital with an attack of severe abdominal cramps, constipation of a few days' duration, and abdominal distention. This was relieved by the passage of a rectal tube high up into the sigmoid, and the patient was discharged a few days later. She remained comparatively well from this time until February 1, 1927, when she was again admitted to the Hospital.

In the interval between her discharge from the Hospital and the present time she has suffered from rather marked constipation which has required constant attention in the form of cathartics and enemas. For four days prior to admission her bowels failed to move despite cathartics, enemas and colon irrigations. She had severe abdominal cramps and vomiting on the day of admission. Abdominal examination revealed a distended abdomen. During her cramp-like seizures a mass appeared in the epigastrium which disappeared as soon as the cramp was over. The distention was general but more marked in the lower half of the abdomen. There was definite visible peristalsis seen in the large bowel, more pronounced in the left lower quadrant of the abdomen. She was given castor oil, which was vomited an hour after. Enemas and irrigations were ineffectual. Finally a long rectal tube was passed a distance of over 16 inches, evidently beyond the point of obstruction, and this procedure was followed immediately by the passage of large amounts of fluid feces and flatus. This rectal tube was left in place for some time. A barium enema taken a few days afterwards, showed a marked redundancy of the sigmoid, the latter reaching almost to the level of the left diaphragm. The entire colon was distended.

The patient was discharged from the Hospital with instructions as to the use of the rectal tube.

The question arises as to whether operative treatment is indicated, and what type of operation would be preferable. Judging from the literature, the general experience has been that in the ordinary fixation operations for volvulus this condition frequently recurs, despite all methods of treatment. In a recent publication by Hagen-Torn, the author describes a new operative procedure which consists in plication of the mesentery on both sides. He claims that by means of this operation recurrences are avoided and at the same time there is no impairment of the circulation. He reports 7 cases which did very well and appeared to be definitely cured.

CARCINOMA OF THE RECTUM*

JOHN C. A. GERSTER, M.D., F.A.C.S.

NEW YORK

ESTHER D., aged forty, admitted to Mt. Sinai Hospital, service of Dr. A. A. Berg, May 4, 1927, with a history of constipation for the past year. For the past six weeks she had become decidedly worse with occasional blood in the stool. There was anorexia and a loss of 20 lbs. during the past six months. Several years previously an appendectomy with removal of the right ovary had been performed at another hospital.

Physical examination showed an emaciated cachetic female whose general physical exami-

* Read before Section of Surgery, New York Academy of Medicine, January 6, 1928.

nation revealed nothing abnormal except that the lower margin of the liver was two fingers below the free border of the ribs, the spleen and kidneys palpable. Rectal examination showed a hard irregular mass 1½ inches above the anus fixed to the uterus in front and not very movable from side to side. Blood pressure 114/80; hemoglobin 70 per cent; Wassermann negative.

She was on the medical side for a fortnight before being transferred to the surgical ward. On May 25th combined abdominoperineal operation was performed under spinal anaesthesia, which after three quarters of an hour had to be supplemented with nitrous oxide, oxygen and ether. The liver was found to be free and the posterior surface of the uterus was firmly adherent to a tumor of the rectosigmoid the size of a peach. Supravaginal hysterectomy liberated the uterus; the rectosigmoid was mobilized for a distance of two inches below and five inches above the tumor. The inferior mesenteric vessels were divided between ligatures. At the pelvic brim the peritoneal diaphragm was reestablished, care being taken to approximate accurately the sigmoid where it passed through this diaphragm into the pelvis, the mobilized gut with adherent uterus lying beneath this diaphragm. The abdominal wound was closed in layers and dressing applied.

A median incision 2½ inches long began 1 inch from the anus. The coccyx was removed; deep fascia in front of coccyx incised transversely and the tumor-bearing loop of the gut was delivered into the wound. The afferent and efferent loops were then sutured to each other, first on one side and then on the other, and their margins were then accurately stitched to the skin edges at the point of emergence. A row of interrupted black silk guide sutures were passed and left long to mark proper point for eventual amputation. The uterus in the course of handling was inadvertently separated from the tumor mass. Postoperative course was uneventful. Twelve days after operation Dr. Richard Lewisohn amputated the tumor-bearing loop flush with the skin. A transfusion of 300 cc. was also given as a precautionary measure.

On June 28th, a clamp was applied to the spur which cut through in three days. An interval of three months was then permitted before closure of sacral colostomy. During this time the patient lived in a roof ward and gained remarkably in her general condition.

On August 24th the sacral colostomy was closed under general anesthesia. As soon as the circular incision at mucocutaneous margin was completed, intestinal stoma retracted fully 1 inch. Further freeing of the intestinal wall permitted transverse suture of the opening without tension in two layers. The skin edges were then freshened and the skin and subcutaneous tissues were approximated, except at the lowermost angle of the wound where a rubber dam drainage emerged from the intestinal suture line. The patient was kept constipated for one week. A mild pyocyaneous infection was readily controlled with powdered boric acid. The sutured part of the wound healed by primary union. Catharsis and enemata at no time resulted in any leak.

About four months after admission, September 11, 1927, the patient was discharged, having normal bowel movements, having gained about 10 lbs. in weight and rectal examination showed a relative narrowing at the site of anastomosis which readily admitted the index finger.

On November 5, 1927, a barium enema rapidly filled the entire colon which appeared normal throughout. To date rectal examination shows no increase in the slight constriction at the point of anastomosis.

In passing it might be of interest to note that Küttner* reported a series of ten cases with one death, in which this procedure was employed and where growths as high as 22 cm. from the anus were delivered through the sacral wound. Küttner reserved this procedure for emaciated individuals in poor general condition.

**Zentralbl. f. chir.*, 1910, p. 604.

STONE IN HYPOPLASTIC MALPLACED KIDNEY*

Edwin Beer, M.D., F.A.C.S.

NEW YORK

THE patient, male, forty years of age, for the last year has had right sided colics which have gradually become more frequent. There has been no hematuria and no temperature. The roengtenogram of the genitourinary tract showed a shadow just above the posterior superior spine, on the right side. The shadow is semilunar in shape and lies transversally along its axis. The patient's voided urine was perfectly clear.

On admission to Mount Sinai Hospital, roentgenological studies of the genitourinary tract showed the right kidney to be low, part of it being in the false pelvis. There was a stone apparently in this kidney near the crest of the ilium. On pyelography, the kidney was found partly in the pelvis, its upper pole extending a little above the crest of the ilium. The calices are dilated and blunt, and two of them pointed towards the spine, whereas the lowest calyx pointed in the opposite direction. Pyelograms of the opposite kidney showed slight abnormalities but the kidney was placed normally and the pelvis was apparently bifid.

Cystoscopic examination of the separated urines showed that the function of the right side was diminished, and microscopic examination showed some pus cells.

On May 27, 1927, with a diagnosis of stone in a non-rotated kidney, the right kidney was exposed through a very low incision starting in the lumbar region and coming down in to the right iliac fossa, and since the kidney was converted into a hydronephrotic sac it was removed. The organ was found deformed and hypoplastic, and about one-half the size of a normal kidney. The pelvis presented anteriorly, and the kidney itself was held close to the midline and in the false pelvis by at least three groups of veins and arteries which entered the kidney on its mesial and anterior surfaces. In addition, one large vein ran across the lateral convexity over the upper pole, and a small vein entered posteriorly. All of these vessels had to be tied separately, and then the ureter was ligated and the specimen removed. The kidney was about 2¾ by 1¼ inches, having a fair residual of healthy parenchyma surrounding the dilated pelvis and over the calices.

The ureter entered the anterior surface near the lower pole and divided into three branches, two wide lateral branches and a superior branch which became a calyx of the upper pole. In the upper pole this extra calyx was divided into two small lateral branches. This created practically a condition without any definite intrarenal pelvis, all the branches being evident external to the kidney parenchyma except the terminal short piece. The stone was found stuck firmly within the first lateral branch of the pelvis near the lower pole in the external part of the kidney.

After a mild wound infection, the patient made an uneventful recovery.

ROENTGENOGRAPHIC EVIDENCE OF PERINEPHRITIC ABSCESS*

Edwin Beer, M.D., F.A.C.S.

NEW YORK

ALTHOUGH the majority of perinephritic abscesses are easily recognized, there is a large group of cases in which perinephritic abscess is present and in which the diagnosis is very difficult. Whether all of these abscesses originate in the kidney parenchyma or not, the urinary findings are usually of so little value that they do not help in the diagnosis. For many years, just as W. F. Braasch has done, I have tried to make use of urine cultures

* Read before Section of Genito-Urinary Surgery, New York Academy of Medicine, Dec. 21, 1927.

to determine the presence of such an infection in and about the kidney, but although a certain percentage of the cultures have given us staphylococcus aureus, it was too small a percentage to be of real clinical import.

In those obscure cases which run along under the care of the family physician with a diagnosis of typhoid fever, influenza, pulmonary tuberculosis, endocarditis, etc., it would be of great value if additional physical evidence of the presence of a perinephritic involvement could be obtained by some of our laboratory methods. In going over a series of roentgenograms, it has seemed to me that there are certain roentgenological findings which may help to confirm the diagnosis when suspicion of a perinephritic inflammation has been aroused and when the local signs are not absolutely diagnostic. In children this aid would be particularly valuable.

In studying the flat plates or films of patients suffering from perinephritic abscess, I have observed two signs which, when associated, may prove of diagnostic value. As far as my literature search is concerned, as yet no description of these two roentgenological features of perinephritic abscess has been encountered, though one of them, the obscuration of the lateral edge of the psoas muscle I recall discussing several years ago at the East Side Medical Society, and Ockerblad has also mentioned this in his discussion. A recent study of a number of flat plates of these cases has shown *first, that the spine is curved away from the involved side,* perhaps due to contraction of the spinal muscles near the suppurating focus. This arching of the spine towards the opposite side, as can readily be seen in the demonstrated films of a large number of cases, is interesting and significant. As the inflammatory condition disappears, the spine becomes straight again.

The *second roentgenographic evidence of perinephric abscess, obscuration of the outer margin of the psoas muscle,* is apparently less regularly present, although in many cases it also is very definite. The mass produced by the abscess and perinephric swelling obscure the outer margin of the psoas muscle, and as a result there is a striking contract between the edges of the two psoas muscles, on one side the edge being clear-cut and on the other no edge (or a very faint one) being visible. Naturally, any large kidney growth or large lower pole kidney or retroperitoneal tumor, as well as a psoas abscess, may do the same thing. Although such kidney tumors, or hydronephroses, etc., may overlie the psoas edge and obscure it, still unless there is an infection or a blockade with infection of such a kidney, apparently one fails to get a reflex contraction of the muscles which leads to the arching of the spine away from the involved side. In view of the fact that these latter cases are likely to give urinary findings of a pathological character on the side involved, this also will exclude the presence of a perinephric abscess which, as I said in the opening remarks, is usually associated with no marked change in the urinary secretion.

DISCUSSION

Dr. Clyde W. Collings: I might add a word to what Doctor Beer said. An interne at Bellevue Hospital, Doctor Bates, drew Doctor Keye's attention to the obliteration of the psoas muscle in perinephritic abscess about five years ago. We feel this roentgenographic finding greatly aids us in diagnosing a perinephritic abscess.

UREMIA DUE TO URETERAL OBSTRUCTION: NEPHROSTOMY*

Paul W. Aschner, M.D., F.A.C.S.

NEW YORK

THE patient is now in the hospital after a second operation. He is a man of forty years, admitted to the medical service for loss of weight, headaches, nausea and vomiting. The only other symptom was a slight hematuria a few days before admission to the hospital. His systolic blood pressure was found to be 138 to 140; the urine was grossly clear, with a

* Read before Section of Genito-Urinary Surgery, New York Academy of Medicine, Dec. 21, 1927.

specific gravity of 1.004. The specific gravity was fairly fixed, never above 1.010. The blood urea nitrogen was 120 mgm. The medical diagnosis was chronic nephritis or possibly polycystic kidneys.

Roentgenographic examination showed a small kidney outlined on the left side within which was a faint triangular shadow interpreted as a stone. On the opposite side was seen a kidney about twice the size of the one on the left.

I therefore suggested that the patient had a stone in the left kidney producing an atrophic condition of that organ, rendering it incapable of being sufficient for the excretory functions of the organism, and that he had probably been living for some time on the opposite kidney which was now obstructed.

Cystoscopy showed urine coming from the left kidney, pale watery urine such as he was passing from the bladder. On the right side was an obstruction at 15 cm. which was passed after some effort, and 90 cc. of purulent urine were aspirated. The catheter was left in place for drainage.

He was suburemic, and that was a factor in his having no pain. With ureteral drainage the blood urea gradually came down to 70 mg. Then he developed fever and chills and the right kidney region became very tender. I thought it time to do more than drain the kidney by catheter because he now had cortical infection and was doing badly. After a preliminary phlebotomy and transfusion, I exposed the kidney and found the cortex studded with small abscesses. A nephrostomy was done and the kidney decapsulated. He was desperately sick for three or four days. The blood urea came down gradually to 28 mgms. Three or four weeks after the nephrostomy, he passed, without any pain, a stone 1 × 0.5 cm. composed of uric acid, which therefore had cast no shadow in the roentgenogram. Thus without colic, the kidney wide open and draining freely, the stone passed down the ureter and into the bladder. It seems that this is evidence of the ability of the ureter to expel calculi without the factors of renal distension and back pressure.

The nephrostomy tube was removed and the kidney closed promptly. The patient went home feeling very well with blood urea 30 mg. The urine, however, showed considerable pus.

A few weeks ago he began to feel poorly, lost appetite, weight and strength, and was constantly nauseated. The urine became very purulent. He had stiffness of the extremities and muscular cramps. The blood urea had again mounted to 45.0 mgm.

Cystoscopic examination showed no obstruction and clear urine on the right (operated) side. Thick pus was seen coming from the left ureter which presented an impassable obstruction to the catheter at 20 cm. Pyonephrosis of the left kidney was therefore diagnosed. Two days ago this kidney was exposed and found to be a pus sac. The ureter was obstructed by granulation tissue and stricture at the ureteropelvic junction where the tip of the calculus impinged. The kidney was therefore removed and the patient is making a smooth postoperative recovery.

VESICOURETERAL REFLUX IN CYSTOGRAPHY*

PAUL W. ASCHNER, M.D., F.A.C.S.

NEW YORK

I HAVE reviewed the cystographic studies made on Dr. Beer's service at the Mount Sinai Hospital since 1920 with especial reference to the incidence of vesicoureteral and vesicorenal reflux. It has been the practice on that service not to employ cystography as a routine procedure but to use it only in those instances in which we felt it would add to the accuracy of our cystoscopic diagnosis, and in cases in which cystoscopy could not be undertaken. The number of cases thus studied was 202 of which 173 showed no evidence of reflux. Reflux was demonstrated in 29 cases, about 14 per cent of all cases examined.

The technique consisted of injecting 5 ounces of 6 per cent sodium iodide for one

* Read before Section of Genito-Uirnary Surgery, New York Academy of Medicine, Dec. 21, 1927.

exposure, then 3 ounces more for the second exposure. Anteroposterior and lateral-oblique positions were employed. Finally the iodide was permitted to run out and 5 ounces of air were injected.

Certain observations of interest were made. The phenomenon of reflux is not constant. In several cases it was present at one examination and not subsequently, or vice versa.

In relation to the cystoscopic appearance of the ureters reflux occurred in two types of cases: (a) cases in which the ureteral orifices were wide open, patulous and rigid; (b) cases in which the ureters could not be catheterized for more than a centimeter. The orifice was normal in size but there were evidences of disease of the bladder wall about the orifice such as polypoid edema, interstitial cystitis, tuberculosis, etc.

We have also had some instances of pyleographic examination of one kidney in which the medium descended into the bladder and ascended through the opposite ureter, demonstrating the possibility of error in diagnosing bilateral renal tuberculosis.

Reflux was not observed in any of the 39 normal cases examined. The negative cases comprised a great variety of pathological conditions, such as neoplasm, diverticulum, prostatic obstruction, contracture of vesical neck, cystitis of various types, etc.

The positive cases were as follows:

Cystitis (tuberculous or non specific)	6
Prostatic obstruction	3
Diverticulum	4
Neoplasm	5
Contracture of vesical neck and urethral obstructions:	
Adults	5
Children	6

PAPILLARY CARCINOMA OF BLADDER

RESECTION; TWO CASES CURED FIVE AND SEVEN YEARS*

Paul W. Aschner, M.D., F.A.C.S.

NEW YORK

THE first patient was a man treated in 1917 in the out-patient department for a papillary tumor of the bladder by fulguration. He then disappeared but returned in 1920 with a recurrence of hematuria. On cystoscopic examination he presented a large flat sessile type of papillary growth on the right wall of the bladder and on the floor behind the trigone but not involving the ureteral orifice. A biopsy specimen was reported papillary carcinoma. Using Dr. Beer's technique, a cautery resection was done, having first catheterized the ureters so that they could be easily identified in the operative field. Although I resected fairly close to the right ureteral orifice, I felt that it was not necessary to resect the ureter itself.

In the course of convalescence, the patient developed a small soft stone in the bladder, and on attempting to remove it cystoscopically under gas anesthesia, there occurred a perforation of the bladder wall where the resection had been done a month before. He was watched for a few hours, and then, it being decided that he had a penetration of the bladder, he was reoperated. The stone was removed and the small penetration of the posterior wall sewed up. The pouch of Douglas and the bladder were drained. The patient recovered.

After discharge from the hospital I did not hear from him again until I looked him up recently. He was cystoscoped and the bladder found free of tumor.

The other patient had a somewhat different course. He was first treated about 1918 in the out-patient department for papillary tumor of the bladder by fulguration, and later came in with a recurrence and was again treated with fulguration. He had three or four large tumors in the bladder, and in the course of treatment of one of these tumors he developed

* Read before Section of Genito-Urinary Surgery, New York Academy of Medicine, Dec. 21, 1927.

some very acute symptoms which we don't usually see: marked tenesmus, burning and pain, etc. On rectal examination, he presented on the side where one of the tumors had been fulgurated a soft, boggy, tender swelling, which was somewhat puzzling to interpret. Because of these acute symptoms, he was operated and I found an extraperitoneal perforation of the bladder wall caused by the high frequency current. . . . An extra vesical exudate had formed at the base of the tumor which had been destroyed. The other tumors were destroyed by cautery. He healed up and was well until 1922. He had a recurrence presenting three tumors, one way up at the fundus. Two yielded to cystoscopic fulguration. The fundal tumor was not influenced thereby. A biopsy showed it to be a papillary carcinoma.

A resection of the fundus was therefore done which was rather difficult on account of the previous operation. He healed up well and came back about two years ago with a very small papillary growth at the fundus again; this was benign and disappeared with fulguration. He has to void often and has some contracture of the vesical neck. He was cystoscoped recently and his bladder was found to be inflamed but with no evidence of growth anywhere.

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EDITORIALS

SHOP TALK

NOTWITHSTANDING the fact that over ninety per cent of all practicing physicians at some time in their professional lives write at least one article for publication in a medical or surgical journal, only a scant minority have any idea of how to submit their material for editorial consideration.

We have no intention of repeating the well-known and time-tried formula of how to write a scientific paper. Anyone interested we refer to the editorial staff of *The Journal of the American Medical Association*. On the matter of the hows and whys of the mechanics of writing an article and in what final shape it should be arranged before mailing to the chosen journal, we refer the reader to two splendid writings by Dr. Walter M. Brickner which are to be found in THE AMERICAN JOURNAL OF SURGERY.* Dr. Brickner covered the subject thoroughly and anyone following the advice offered will lessen an editor's work and keep unruffled his otherwise placid disposition.

Eliminating consideration of the finer points of this subject, we repeat a few fundamentals.

All manuscripts should be typewritten on one side of paper only, double spaced, the pages numbered, *each* page carrying the author's name or the title of his article.

On the first page it is well to write at the top where and when the paper was read. If it is an original communication not presented before a society this is obviously unnecessary. The title of the paper follows. Under the title should come the author's name with the degrees he wishes printed. Often the author writes his name, Cyrus K. Smith-Jones, M.D., and after the issue appears with his article

*How to prepare a medical article. 1921, xxxv, 67. The writing of medical papers. 1922, xxxvi, 233.

among the contents, the editor receives a letter written in a peevish tone asking why the B.S. or F.A.C.S. was not added. Few editors are really proficient mind readers. After the author has written his name and titles he adds his city or town, as Boston, Mass., Newark, N. J., Milford Conn. THE AMERICAN JOURNAL OF SURGERY does not publish on the title page of an article the author's official connections. This is done under "THIS MONTH'S CONTRIBUTORS." To save time and needless correspondence it is well for the author to list what teaching and hospital positions he wishes published.

The editor uses his judgment in writing the running heads. A running head is an abbreviated title used at the top of each page following the title page. As an example we select one at random. The title reads, "An Immobilizing Cage for the Treatment of Burns and Skin Grafts." The running head reads, "Immobilizing Cage." Sometimes the editor's idea of a running head is at variance with what the author has in mind. Therefore, on the first page of the manuscript it is well for the author to write the running head.

If the article is the result of work done in a hospital division or of research made possible by a grant, this should be noted. Example: "From the Second Surgical Division of The General Hospital," or "From the Kidney Clinic of the Community Hospital."

If illustrations are to be used and the author has in mind a special position for each one, it is well to note this in the text. At a point in the text make note, "Figure 1," etc.

In regard to references and bibliography, each reference may be noted by number in the text and so printed at the bottom of each printed page, or published at the conclusion of the article. The manner of recording references and bibliography will not be considered here. If the author has doubts on this phase of the subject, he is referred to any national journal and there he may note the plan followed.

When illustrations are to accompany an article it is well to remember the publisher allows an author only so many illustrations.

Many authors wish the artist's name to appear on the illustration. Therefore, it should be insisted the artist sign his name close to or under the drawing. If it appears down in the lower right hand corner two or three inches away from the lower right hand margin of the drawing, it is costly and wasteful to reproduce it.

Many authors write the legends on the back of the illustrations or paste typewritten legends to the bottom of the illustrations. This necessitates extra work with consequent possibility of mistakes. Simply number each illustration and at the end of the article write a heading, "Legends." Then write the legend to appear with each illustration, numbering each to match the illustration.

Send all illustrations flat and not rolled.

Before submitting manuscript make sure you have edited it to your satisfaction. See that the copy is legible. Verify references and see that the spelling is correct. Each reference is verified by the editorial staff and a mistake in spelling or carelessness in correctly naming the publication or book and the date or number of issue costs money and takes hours of time. As an example: don't refer to "Denny" when you mean "Denby." Your manuscript will be carefully read by several people and obvious editorial mistakes corrected. Then your copy goes to the printer. The author receives a galley proof. It is his duty to correct typographical errors. Should he, as so many do, rewrite the entire article on the galley proof, adding new material, changing the position of sentences and paragraphs and deleting parts, he should understand that he will be charged for printer's changes. The printer charges the publisher for such changes in the galley and this is, in all fairness, passed on to the author. The same holds true regarding page proofs.

A last word. When galley or page proofs are sent an author it is his duty to correct

them immediately and return them to the publisher. The American Journal of Surgery is laid out months in advance. Once the "dead line" is passed and proofs have not been returned, the author is omitted from the forthcoming issue and may have to wait months until his article is published.

With the galley proof the author will receive a form to be read and followed if reprints are desired. No reprints are furnished with a published article. Do not write the editor a letter saying a hundred or a thousand reprints are wanted; order them from the publisher who will then quote prices.

These facts may seem elementary to most authors but one would not think so were he in a position to receive and judge manuscripts submitted for publication.

Any editor will have more time for golf, fishing or killing time in genial shop talk if these few suggestions are observed and followed.

T. S. W.

ACUTE APPENDICITIS

DESPITE many years of intensive effort and a constantly increasing alertness, both on the part of the laity and the profession, the death rate from acute appendicitis remains about stationary.

Many factors contribute to that situation. Often the afflicted individual ignores the symptoms, or is sympathetically ministered to by friends, neighbors or relatives. Indeed the dispenser at the soda fountain is often consulted, with the inevitable result that a copious draught of castor oil, suitably disguised, is dispensed, causing much intestinal commotion and frequently great damage.

Patients thus often present themselves for diagnosis after many valuable hours have been lost and their condition seriously imperiled by home medication. The unwise use of cathartics costs many lives.

To say that the diagnosis of acute appendicitis offers difficulties to the physician smacks of the bromidic. Yet no common condition varies in its symptomatology more than this.

It is commonly and properly taught that the usual picture of acute appendicitis is one of pain, nausea, vomiting and spasm of the right rectus muscle in the lower quadrant where the pain, after a beginning epigastric or periumbilical situation, localizes. Carrying that picture in mind is beneficial in a typical case. Unfortunately, all are not typical and if the examining physician carries only the fixed picture, (vide supra) the diagnosis will often be missed.

If, in the cosmic scheme, the appendix were as completely oriented as the nose, the eyes or the ears, the problem would be less difficult. Unhappily, it may in the process of construction be deposited anywhere in the abdomen; later in life, it may be out of the abdomen in a hernial sac. In other words, lacking a fixed site within our perplexing interiors we are scarcely warranted in carrying a fixed picture to which we endeavor to make the case conform.

The two most common variants in the position of the cecal diverticulum are high and low. The appendix may be high, above the right iliac fossa, generally lying to the outer side of, or behind, the cecum and ascending colon, the tip often reaching the lower pole of the kidney. Again it may be low, lying at the brim of, or completely within, the true pelvis.

In either instance the onset may be typical but the physical findings are not. Herein is the danger of the fixed picture. Examination of the abdomen will reveal an absence of rectus spasm, of tenderness at McBurney's point. Ergo, the lesion is not situated in the appendix. Procrastination ensues and operation comes late, sometimes too late.

There must be incorporated in the picture the fundamental fact that the appendix is a nomad and that the absence of the usual abdominal findings does not preclude the diagnosis of acute appendicitis. Pain and tenderness in the right costo-

iliac space or in midline between navel and pubis are definitely part of the symptom complex of appendicitis. And further, no physical examination when this lesion is suspected is complete without careful examination per rectum.

A wider appreciation of the anatomy of the appendix and its relation to diagnosis will be materially helpful and will lead to earlier diagnosis, earlier operation and a consequent reduction in the mortality.

Frank D. Jennings, M.D.

DR. ROBERT ABBE

Dr. Robert Abbe, internationally known surgeon, died at his home on March 7, aged seventy-seven years.

In a future number of The American Journal of Surgery there will appear an appreciation of Dr. Abbe, the man and his works, written by one of his life-long friends.

CORRESPONDENCE

To The Editor:

In *The Journal of the American Medical Association* of January 21, appears an article by Dr. DeLee of Chicago entitled "Identification of New Born Babies in Maternities."

The methods of tagging and bookkeeping, though complicated, are excellent and ingenious. They require, however, considerable clerical departmental work and the technique is so elaborate as to tax the patience of the frequently fatigued assistants. Unfortunately, also, the credulous mother remains suspicious, especially if her infant does not possess the charms of her neighbor's in the adjoining cot! Her doubts increase as years advance.

May I suggest tattooing these little ones? It is simply and easily done. A drop of India ink etched in with a sterile needle takes but a few moments and is almost or quite painless. By means of a simple cipher code or modified telegraphic alphabet an index to full hospital records and dates might be secured, or even the date and number with the initials of the accoucheur should render a mistake impossible. Complete confidence of the alarmed mother would be restored on seeing the indelible record before her as incontestable proof. Still better, a simple mark or scratch upon the mother in the same location and of the same form as that upon the baby would set every doubt aside. This marking need not be cosmetically objectionable, as the required data could be inscribed in the fold of the buttock or under the left arm in the axilla.

Such note indexing has been practiced by me for several years in connection with my hospital records in most of my abdominal surgery.* The minute dots and dashes have never been objected to—quite the reverse—and I am sure that anxious mothers would be far less adverse to hospital confinement if some such tattooing were known to be practiced in every instance before the baby left the delivery room.

O'Neill Kane, M. D., F. A. C. S.
230 Clay St.,
Kane, Pa.

* Kane, E. O. Tattooing surgeon's initials and date in wireless code. Am. J. Surg., 1924, xxxviii, 266.

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[From Fernelius' Universa Medicina, Geneva, 1679.]

BOOKSHELF BROWSING

DR. FREDERICK LANGE

A GREAT SURGEON

JOHN HAMMOND BRADSHAW, M.D., F.A.C.S.

ORANGE, N. J.

THE death the other day of Dr. Frederick Lange in Berlin, Germany, recalls to his many friends in America a remarkable personality. Born in North Germany in 1850, after graduation in medicine at Bonn he came under the notice of the great Esmarch and at the time of the Franco-Prussian War in 1871 was his First Assistant. During this war he was regimental surgeon and entered Paris in that capacity with Crown Prince Frederick's army. His broad ideas of human government made him turn to America for his ideals, and in 1881 he came to New York to establish what proved in future years one of the greatest surgical practices of that day. He located his first office on 23rd Street next door to the College of Physicians and Surgeons, and unknown, unheralded, and unsung he waited many tiresome weeks for his first patient. His first case in America came when a butcher's wagon was wrecked at his very doorstep, and he took into his room a small butcher's boy who had a compound comminuted fracture of the leg. These cases at that time were usually amputated, but Dr. Lange said he could save the leg, which he did, and as the result was then so unusual, it gave him his start. He joined the City and State Medical Societies and became a naturalized citizen in the country of his adoption. His ability was so soon recognized that he was appointed Attending Surgeon to Bellevue Hospital, an unusual honor for a newcomer. At that time antiseptic surgery was being read about but little practiced, and septic fever and hospital gangrene swept the wards and filled the coffins.

It was Dr. Lange who was largely instrumental in making Bellevue a pioneer hospital in this work. "In April, 1883, when Dr. Frederick Lange introduced scientific antisepsis into Bellevue, a very active revolution in wound treatment started . . . In July, 1883, Dr. Lange went on duty as Visiting Surgeon to the Fourth Surgical Division of Bellevue Hospital, and in not one case from that time until the end of my service in April, 1884, did septicemia, pyemia, or erysipelas attack accidental wounds." (Morris) Dr. Lange was made Attending Surgeon to the German Hospital and Consulting Surgeon to the Presbyterian and other institutions. He built his own private hospital on Lexington Avenue and 57th Street and his ideas were so advanced that this Hospital, now called the "Lexington," is still

running in very much the same manner as planned by Dr. Lange in the 80's. It was in this hospital that Dr. Lange removed the first kidney that had ever been removed in New York City (if not in America). His skill and fame brought patients to him from afar, and the writer remembers assisting him in removing a tumor from a woman who because of his reputation came to him from California. Dr. Lange's business astuteness and ability were unusual for a doctor, and he acquired much real estate on Riverside Drive, New York City, then in a formative state, which property afterwards increased greatly in valuation and made him rich.

Among his many noted patients was Jan Ignatz Paderewski, upon whose hand Dr. Lange operated. It was an achievement as well as a mental strain to preserve the fingers of this man, probably the greatest pianist the world has ever seen. Dr. Lange was a man of broad culture, and married a pianist of great ability after the unusual engagement period of seventeen years. He had, however, rather a romantic and poetic side to his many-sided nature, and every morning before breakfast he would bring out some choice bit of poetry or literature to read to his wife (for he had no children) or to his frequent guests. His hospitality was famous, and his cellars in those pre-Volstead days were so well stocked with importations that few invitations to his suppers were refused.

An amusing anecdote of this period tells how one day he shaved off his long flowing beard (much like that seen in pictures of Emperor Frederick of Germany), making such a change in his appearance that his most intimate friends did not recognize him. As a joke he then called in the guise of a patient on one of his old friends, a celebrated specialist, with a string of fictitious symptoms. He hailed with glee (and acclaim!) a diagnosis of cancer of the rectum that was made after a digital examination. It is said that it was years before he was forgiven.

In his fifty-second year Dr. Lange suddenly resigned one of the most lucrative of surgical practices in the City of New York. He had always had a subconscious wish to be a farmer. Buying some thousands of acres of land in North Germany, near the town of Lankarrek, where he was born, he now lived the life of a wealthy landowner and delighted in fine breeds of livestock, and by large donations of money built and established many benefactions. But he was too young to retire from such an active life as he had been living in New York, and the new life, although it had been idealized in his dreams, proved a disappointment. He sank into a deep melancholy, which was intensified by the war, with occasional remissions. During one of these he visited New York City and dined with the writer. On his return to Germany in another year he suffered a slight cerebral hemorrhage from which he never completely recovered, and the end came at Berlin, May 9, 1927.

BOOK REVIEWS

Fistula of the Anus and Rectum. By Charles John Drueck, M.D., F.A.C.S., Prof. of Rectal Diseases, Post-Graduate Hosp. and Medical School, Chicago. Cloth. Pp. 318; 66 illus. Phila. F. A. Davis Co., 1927.

Proctology, a specialty much neglected by many medical schools and the general surgeon, has made rapid strides in recent years. It is not uncommon for the surgeon to complete an abdominal operation and then turn the patient over to the house surgeon to care for some rectal condition. Minimizing the minor has spoiled the effect of many major operations, resulting in dissatisfied patients. Fistula of the anus and rectum numbers more unsuccessful operations in proportion than almost any other surgical operation.

In this excellent book Drueck dwells first on the systems, diagnosis and treatment of the various types of abscess that are the forerunner of fistula of the anus and rectum. He next classifies and describes the various types of fistula with their symptoms, diagnosis, conservative and radical treatment, especially emphasizing the postoperative care, without

which no fistula operation can be successful. This section is well written and excellently illustrated by roentgenograms, photographs and original drawings. Chapters on Tuberculosis of the Anus and Rectum, Accidents and Complications and Misfortunes Following Operations for Fistula of the Anus and Rectum are very instructive. This book will make a valuable addition to the library of the general surgeon and the proctologist.

We are indebted to Dr. Walter Brickner for the following review:

Gonococcal Infection in the Male. By Abr. L. Wolbarst, M.D., Urologist and Director of Urological Clinics, Beth Israel Hosp.; Consulting Urologist, Central Islip, Manhattan State, and Jewish Memorial Hosps. 8 vo., Cloth. Pp. 237, 89 Illus. St. Louis, C. V. Mosby Co., 1927.

The author's purpose is "to present to the general practitioner a working familiarity with the present day methods of diagnosis and treatment, based largely upon his personal experiences." He states: "There has been considerable advance in our knowledge of the treatment of male gonorrhoea and its complications. The therapeutic advance has been most marked as regards physical therapy, intravenous and local medication, protein therapy and, most important of all, the advance marked by the epochal work of Belfield and his associates on the seminal vesicles."

Without questioning just how new all these various measures are, we must agree on the importance of a serious study of gonorrhoea and that "gentleness in the therapeutic attack is the keynote to successful results."

Chapter III contains such true clinical observations as "gonorrhea in the male may be the result of infection from a woman, in whom clinically and microscopically there is no evidence of gonorrhoea. It may be the result of an autoinfection from gonococci hidden in some part of his own genital tract." A test to demonstrate this, not mentioned in this book, is the simple procedure of having the patient void his urine, stripping the prostate and vesicles and asking the patient not to void for at least five hours. The latent gonococci, present in the expressed prostatic and vesicular secretions, set up a reinfection of the apparently cured anterior urethra, simulating a fresh infection.

The involvement of the superficial glands of the urethra, the crypts of Morgagni and the glands of Littré are part and parcel of this infection and are not to be considered a complication. The author points out the difficulties of overcoming the invading host in a clearly described pathology of the acute infection.

The general practitioner will find of value the chapters on acute gonorrhea, diagnosis and treatment. Neoreargon is advised as an injection. This is an expensive drug, and in the reviewer's hands has given no better results than the much cheaper silver albuminates. The author proceeds with mild local treatment at the earliest possible time; we think this is the best present advice. We believe local anesthesia should be used freely.

The author states (page 64): "Persistence of the gonococci makes it desirable to change medicament from time to time. There is good reason to believe that the bacterial organism develops a form of immunity or fastness when attacked by the same chemical substance continuously; it likewise is generally recognized that there are many strains of gonococci, some of which react to one drug while others respond to another."

Of this teaching we agree with Balog who states: "I have nowhere found the basis of the theory upon which the change of remedies and concentration rests. The assumption is untenable when intelligently considered. If a remedy is injected and the discharge ceases and no gonococci are found, this is proof that the remedy kills the gonococci lying in the lumen of the urethra, prevents the multiplication of the bacteria and thus may keep the urethra free. If the discharge recurs with gonococci after stopping the injection, the bacteria are not those formerly present but are bacteria resulting from multiplication of the gonococci liberated from infected glands (retention foci). These gonococci can in turn be destroyed but the gonococci in the retention foci cannot be reached with any injection."

Importance is laid upon results obtained in the acute gonorrheal infections with diathermy. We cannot agree with Corbus and O'Conor that they heat tissues locally to 40°C. with this method and that this temperature is lethal to the gonococcus. Schofield has demonstrated that the gonococcus lives in a temperature of 45°C. We have discarded diathermy in the anterior infections, using it only when posterior complications threaten. In posterior

complications diathermy applied through proper electrodes often controls the inflammation and may even abort prostatic abscesses.

Vaccines, non-specific proteins and intravenous therapy we have found of use only when the anterior infections threatened systemic complication. We believe that every case of gonorrhea with fever should be immediately placed in bed.

The therapy and surgical procedures of complications of acute gonorrhea are thoroughly described. The author believes the Belfield operation of vasotomy the best means for control of these complications. The anatomical construction of these organs prevents "sterilisatio magna." Roentgenograms show that the ducts of the seminal vesicles often remain unfilled in places in spite of the pressure used. Especially does this occur in inflamed and constructed gland tubules. In practice we do not obtain the results reported by the author with Belfield's procedure.

The author attacks prostatic abscess through the rectal wall. We cannot agree that this is good surgery. We prefer Steven's operation through the posterior urethra of by the perineal approach.

The chapter on urethral stricture fails to mention Stern's plastic operation for stricture of the posterior urethra.

The author has nothing new to present in any of the other chapters of this book but they are well worth reading.

The final chapter contains McDonagh's interesting views on gonorrhea. The subject of electrons and lysis indirectly does not add much to our knowledge of gonococcal infections.

This book contains many illustrations but we should like to see many more diagrammatic drawings in a work of this kind, simplifying the anatomy, relationship of the parts and operative procedures described.

This book represents the work of an experienced teacher and clinician in urology and can be recommended to the student and practitioner.

The Peaks of Medical History. By Charles L. Dana, A.M., M.D., LL.D. Pp. 105; 40 pl.; 16 text illus. N. Y., Paul B. Hoeber, Inc., 1928.

Dr. LeRoy Crummer writes of this book:

The necessity for a second edition of Dr. Dana's charming book at this time is definite evidence of an increasing interest in the history of medicine. The title chosen by the author is significant in indicating that he has been more interested in the problem of the changes and advances in fundamental medical knowledge than in the biographical details concerning the accredited great in our profession. Such a plan is attractive and while it allows the introduction of names and dates, the main problem, the progress of our art, can be platted as Dr. Dana has done in graphs, and the reader is influenced to elaborate the minor curves by collateral study, which after all is the true purport of historical essays.

The illustrations are not only well chosen but well reproduced and also conform to the title in showing the great men, great books and the great events of medicine. Facing page 64 is reproduced the title page of the 1582 Valverde, a book so rare that it is not mentioned by any of the Vesalian authorities. Even Bryan's Dictionary of Painters and Engravers states that the first edition of Valverde containing the additional plates found in this volume was printed by Guinti, Venice, 1586.

The awakening interest in medical history is of importance to the art of medicine. Many of us have been too busy watching the material strides of the present to be attracted by the slower progress of the past, but it cannot be denied that historical perspective is just as important to the physician as it is to the diplomat.

Lea & Febiger come to us with an old friend and present Otology by Gorham Bacon, A.B., M.D., F.A.C.S., and Truman Lawrence Saunders, A.B., M.D., F.A.C.S., a text of 575 pages which they price at $4.50. The low price does not indicate the value of the book.

The appearance of a third or fourth edition of a book stamps it as "approved." Here we have the eighth edition of Bacon and Saunders' Manual, which is almost equivalent to saying that other criticism is not needed.

The work of the authors shows almost perfect "team work." The junior author is to be congratulated for the facility he has shown in presenting new material in such manner as makes for a perfect composite picture with the old.

The body of readers for the volume is without doubt large but the reviewer believes it could be greatly enlarged with value to each member of the increased number.

A worth while book is Safeguarded Thyroidectomy and Thyroid Surgery, a Manual Designed as a Practical Guide for the General Surgeon. By Charles Conrad Miller. Pp. 261, 52 illus. Index. Phila., F. A. Davis Co., 1928. $3.75.

The writer has attempted, and successfully, to emphasize certain phases of diagnosis and treatment which have been neglected or ignored by other writers. The author feels

that more surgeons would do goiter surgery if the safety of surgery was impressed upon them.

We have before us two books from the Oxford University Press. The first one is Diagnosis and Treatment in Diseases of the Lungs. By Frank E. Tylecote, M.D., D.P.H. (Vict.), F.R.C.P. (Lond.) and George Fletcher, M.A., M.D. (Glas.), M.R.C.P. (Lond.), D.P.H. (Camb.).

In part the Preface reads: "This book aims at placing before the senior student or the young practitioner the ordinary methods of diagnosis and treatment of the commoner forms of lung disease in such manner as to prove helpful to him in practice."

The authors' have kept faith with their promise. A readable book, full of common sense and helpful hints and suggestions. We earnestly recommend it to the student and general practitioner.

The second Oxford publication is Clinical Researches in Acute Abdominal Disease. By Zachary Cope, B.A., M.D., M.S. (Lond.), F.R.C.S. (Eng.). Ed. 2. Pp. 214, 44 illus.

This book constitutes for the most part an expansion of the Arris and Gale lectures delivered at the Royal College of Surgeons in 1922, and published in *The Lancet* the same year. The contents of the book are The Scope of Clinical Research, The Function of the Parietal Peritoneum in Localization of Abdominal Pain, Muscular Rigidity, Cutaneous Hyperasthesia in Acute Abdominal Disease, A Clinical Study of Phrenic Shoulder-Pain, The Differential Diagnosis between Acute Thoracic and Acute Abdominal Lesions, Genito-Urinary Symptoms in Acute Appendicitis, The Femoral Test for Hypogastric Peritonitis, Subacute Perinephric Abscess Occurring without Disease of the Kidney, Extravasation of Bile, Acute Ascending Parenchymatous Enteritis Causing Paralytic Ileus, Shock and Collapse with Special Reference to Acute Abdominal Disease, Index of Names and Index of Subjects. A scholarly work, a work which should be on the shelf of every surgeon's library.

Local Anaesthesia, A Short Course for Students and Surgeons. By Geza de Takáts, M.D., M.S., Foreword by Allen B. Kanavel, A.B., M.D., D.Sc. Pp. 221, 117 illus. N. Y., W. B. Saunders Co., 1928.

The author states that the book is the result of a course given as postgraduate instruction to a limited number of men, with dissection on the cadaver and practical demonstrations. He makes no claim to originality and the book is not recommended as a substitute for textbooks on the subject. The author has tried, and with success, to present in a didactic way methods that have proved to be safe and successful. Surgeons will find it worth while. The illustrations are above the average. We have no criticisms to offer; we cheerfully recommend it to all physicians doing major or minor surgery.

Muscle Function. By Wilhelmine G. Wright, Boston. With a Foreword by J. Playfair McMurrich, Professor of Anatomy, University of Toronto. N. Y., Paul B. Hoeber, Inc., 1928.

In his preface Dr. McMurrich writes an excellent review of Miss Wright's book. Inasmuch as we found the work fascinating, instructive, and entertaining (something often lacking in many notable works) we can do no better than quote in part from Dr. McMurrich in giving you the gist of what is between its covers.

"The interest that during the late War was deservedly awakened in muscle training as a means for remedying or relieving muscular deficiencies produced by wounds has naturally been accompanied by a desire to know fully and accurately how the muscles of the human body act in the performance of its various movements . . . The present work by Miss Wright adds to that information the results of careful observation made under especially favorable conditions . . . The question to be solved is . . . not so much how we may perform various movements but how we do perform them, and this is the question elucidated in the pages of this book."

The chapters include General Principles of Muscle Action, Movements of the Upper Limb, Movements of the Lower Limb, Movements of the Spine, Movements of the Head and Neck, The Muscles of Breathing and List of Muscles Giving the Movement in Which Each Takes Part. A part is devoted to references and there is a complete index.

The Operations of Surgery. By R. P. Rowlands, O.B.E., and Philip Turner, needs no introduction to the American medical profession. This deservedly popular work on surgery is issued in its seventh edition. It is in two volumes of about nine hundred pages each, with 900 illustrations (43 in color), published by Macmillan, 1927. Pp. 1043, 767 illus., 14 plates. A splendid work for every surgeon to be used to refreshen the memory or as a work of reference.

D. Appleton and Company offer GYNECOLOGY by Howard A. Kelly, A.B., M.D., LL.D. and collaborators.

Dr. Kelly in his preface begins: "The day's work done, in the chiaroscuro of the evening I pen my last lines, recording the quis, quid, quibus auxiliis, quomodo—in other words, the rationale of sundry innovations in my work—and ruminating, as I write, upon the happy associations and renewals of friendships and instruction I have received as the work has advanced to its completion." [Dr. Kelly can write (Ed.)!]

The authors have done a thorough and excellent bit of work. Gynecologists and students of gynecology will do well to wander through its pages.

Doctor Arthur Krida sends in the following review:

PRAKTISCHE ORTHOPADIE. Von Dr. A. Schanz. Pp. 560, 504 illus. Berlin, Springer, 1928.

According to the author's foreword, this volume was written primarily for himself. He wished to place a control upon his practical work by reviewing the entire subject of orthopedics to see where he stood and to fill such gaps in his own armamentarium as his survey might disclose.

The author is a sturdy controversialist, and the views he has maintained in numerous contribution to the German literature are here systematized and elatorated, and characteristically enough, most of the text is in the first person. The author's conception of static insufficiency as a result of "overloading" (belastung) of weight bearing joints is set forth in pungent detail. This conception dominates the discussion of the deformities and disabilities of the spine and of the joints of the lower extremities. Idiopathic scoliosis is thus classed as a "static insufficiency" condition of the spine the space devoted to joint tuberculosis and to the paralytic deformities of the foot is relatively scant; on the other hand, a great many rather uncommon deformities, the result of bone and joint trauma, are set forth. The author's method of using long metal nails in bones for immobilization following osteotomy will not be looked upon favorably in this country.

There is no statistical matter, nor any bibliography, except at the foot of page 198.

We are not alone in our opinion that *Annals of Medical History* is the aristocrat of all medical publications. It is quality, plus. It is the nearest to perfection possible as to contents, editing and publishing.

Francis R. Packard, M.D., of Philadelphia is editor. Paul B. Hoeber, Inc., are the publishers. The Associate Editors are Horace Manchester Brown, Le Roy Crummer, Harvey Cushing, Charles L. Dana, George Dock, Fielding H. Garrison, Henry Barton Jacobs, Howard A. Kelly, Arnold C. Klebs, Samuel W. Lambert, Thomas McCrae, Lewis Stephen Pilcher, Sir D'Arcy Power, David Riesman, Sir Humphry Rolleston, John Ruhräh, Charles Singer, Edward C. Streeter and Casey A. Wood—a company of the peers of medical culture.

Annals of Medical History is a quarterly. It carries no advertising matter. Each issue has more than one hundred pages of reading matter. Goudy designed the cover-page and type. The pages measured eight and a half by twelve and a half inches.

With the Spring number, just out, *Annals of Medical History* begins its tenth year of continuous existence. Sir William Osler was vitally interested and concerned with the birth of this publication.

I would like to take you on a pilgrimage through the many delightful and mentally stimulating hours I have had while engaged in reading its pages, but space denies me this privilege and I will have to be satisfied in telling you of the Spring number.

On the cover-page is a portrait of Karl Frederick Burdach, while the frontispiece is a portrait of Dr. Philip Turner of Norwich, Conn. This is one of several illustrations of Charles B. Graves' article, "Dr. Philip Turner of Norwich, Connecticut." Dr. Turner has been the only surgeon-general from the State of Connecticut. The article is interesting to all who enjoy American history and relish side lights thrown on the period of the American Revolution.

"Jared Eliot" by Edward H. Jenkins is an account of a pastor-physician of the 18th century. The last paragraph reads, "Yale College had trained him 'for employment in church and civil state' and he had filled his seventy-eight years with fruitful service to both."

We then come to "Karl Frederick Burdach, June 12, 1776–July 16, 1847" by Theodore H. Bast. Burdach was a very human and wonderful man. Our neurology ended, as far as we are concerned, with graduation from medical

school, and after these twenty-odd years "Column of Burdach" brings back memories of Frederick Tilney when he lectured to us on neuroanatomy. In Bast's article I chuckled over one trifle: "Earlier he (Burdach) had stated that he could hardly consider himself a fully educated man since he was not afflicted with hemorrhoids, and hypochrondria and other diseases of educated folks."

H. B. Anderson is responsible for "Robert Burns, His Medical Friends, Attendants and Biographer." This gem whets the mental appetite in its title.

"John Wesley and Medicine" by C. A. Baragar is the story of the great religious reformer and of his interest in medicine. The author states in his first paragraph, ". . . Few, even of medical men, know that in the midst of a busy itinerant life he wrote and published a treatise on medicine."

The next article is entitled "Constantine Samuel Rafinesque," written by A. H. Barkley. Here is a biography to be deferred until the close of day when work is done and you are comfortable in bed or easy chair.

"Emil Noeggerath (1827–1895)" by Herbert S. Reichle is a portrait of a great physician who laid down fundamental laws which still hold true on the latency of gonorrhea and its role in the production of sterility.

Roger G. Doughty writes of "The History of the Medical Department of the University of Georgia." Its sub-title is, "A Short Story of Its Early Struggles," and this is a modest outline of the contents of the article.

"The Study of Paleopathology in France" by Roy L. Moodie will appeal to those interested in anthropology, but every physician will be interested in the account of the habits and diseases of ancient man. A bibliography of forty works on the subject is appended to the article.

All who are actively engaged in the practice of medicine will read with relish "Fees in Medical History" by Howard Dittrick. I would like to quote from this article in detail, but to enjoy it in full one must read it for himself. In these modern days when we hear on so many sides tirades on the commercialization of medicine it is with surprise we learn that Phalysios paid $9500 upon regaining his sight; that for the cure of King Antiochus, Cleombrotus received what today would be equivalent to from $121,000 to $150,000; that Charmis, a leading physician in Rome asked a fee of $10,000 to attend a patient in the provinces; that the Arabian Caliph Nasr, when saved the necessity of being cut for stone, presented to his physician, Abu Nasr, a fee of about $60,000 besides many rich presents; that an operation for fistula cost Louis XIV (or his people) the equivalent of $200,000; that Charcot's honorarium for watching for a week at the bedside of the late Emperor of Brazil amounted to several thousand pounds. Who knows but that perhaps after all the Golden Age of medicine has passed.

There is an editorial by Francis R. Packard, and seven pages of book reviews—and the number is done.

The price of *Annals of Medical History* is $8.00 a year. I recommend that if you are not one of the elect, a subscriber, you will become one.

Nelson's Loose Leaf Living Surgery, Allen O. Whipple, Editor, Fordyce B. St. John, Associate Editor, J. M. T. Finney, Chairman Advisory Board; Seven Volumes and Composite Index.

There are in front of us four volumes of this new presentation on International Surgery and a careful review of them shows a series of individual articles of which both the editors and the publishers may well be proud.

Volume I, which covers Physiology, Bacteriology, Pathology, Treatment of Infections, Technique, Anesthesia, Complications, and Legal Relations, contains some articles of exceptional interest. The reviewer feels that Sweet's article on "Physiology in Surgery" is one of the most important. He wishes that it might have been longer, for the conception of physiology in its relationship to surgery is one with which every surgeon should be familiar.

Volume II, which covers the subjects of Tumors, Diabetes, Tuberculosis, Nervous System, Plastic Surgery, Head and Neck, and Thyroid Gland, contains an article on "Tumors" by Francis Carter Wood which, while covering only 135 pages, is another contribution the value of which is at once apparent to the reader. The writer wishes that in his classification Dr. Wood had adhered to the clinical instead of the histogenetic. Crile's "Surgery of the Thyroid" is a concise but clear presentation of today's status in this work.

Volume III, which covers the subjects of Orthopedic Surgery, Bones and Joints, Ampu-

tations, The Hand, and the Vascular System, is of equal interest and value with the first two. The reviewer was perhaps more interested in Homans' "Varicose Veins, Varicose Ulcer, Thrombophlebitis and Postphlebitic Induration of the Lower Extremities" and with the article by Leriche, "Conditions Dependent upon Vasomotor Changes in Blood-Vessels," than by others. There is nothing invidious intended in selecting the names of a few of the many contributors because there is an exceptional uniformity of excellence throughout the four volumes. The articles mentioned have simply made a more positive impress upon the reader.

Volume IV, which covers the Thoracic Wall, Pleura and Lungs, The Lymphatics, Esophagus, Heart and Pericardium, Breast, Hernia, and the Diaphragm, is on a parity with the others, although here the reviewer believes that the outstanding article is that by Cutler & Beck on "Surgery of the Heart and Pericardium," though the section on "Hernias" is one of greater clinical value.

The entire work, judged first from the class of contributors, again from the value of the contributions, and last but not least, from the beautiful mechanical presentation, must be given approval by the thoughtful reader. If the three volumes yet to be published are on a par with the ones already off the press this presentation of surgery will undoubtedly stand out as the leading encyclopedic presentation of the subject for many years.

The fact that such an old and reliable concern as Thos. Nelson & Sons are behind this enterprise guarantees its life and the volumes before us prove that the selection of the contributors and the presentation of the subject matter is in the best of editorial hands.

The careful follow up of cases is consistently recommended and expounded upon in practically every article and it must be admitted that this modern efficiency idea, properly applied to all surgical cases, will result in a more rational check up upon the advances of surgical science than has hitherto been possible. This method to the reviewer's knowledge has never been given the degree of attention it receives in this work.

Lehrbuch der Röntgendiagnostik, mit Besonderer Berucksichtigung der Chirurgie (A Textbook of Roentgen Diagnosis, with Special Attention to Surgery.) By H. R. Schinz, with the collaboration of W. Baensch and E. Friedl. Cloth. Pp. 1131, 1772 Illus. 5 photographic plates. Leipzig, Georg Thieme 1928. 98 marks.

This massive textbook of over 1100 pages is dedicated to "The Pioneers of Roentgenology, Heinrich Albers-Schönberg, Antoine Béclére, Gösta Forssell, Guido Holzknecht and George E. Pfahler," and comprises a well-rounded treatment of the whole subject of roentgen diagnosis. After each section follows a bibliography covering the subject discussed, and in these we find what appears to us a considerable neglect of English literature references in general and American ones in particular. It may well be that this book is intended exclusively for the German student or roentgenologist to whom the German literature would be most readily available. However, this shortcoming is a serious one since the book has value as a reference work to roentgenologists of all nationalities. A more generous inclusion of the American literature would give a fairer background and would add considerably to the value of the work. Except for this criticism we have nothing but admiration for the monumental compilation performed by the authors and the very attractive example of the bookmaker's art turned out by the publishers. The authors were assisted in some of the sections by contributions from A. Hotz, O. Jüngling, E. Liebmann, E. Looser, and K. Ulrich. There are included 1722 text figures, some of them in colors and also five photographic plates of roentgenograms. The reproductions in all cases are remarkably clear and reveal considerable detail.

The scope of the work may be indicated by the chapter headings. There is an introductory chapter of twenty-two pages in which are discussed the theory of the roentgen picture, general procedure in roentgen diagnosis, and measures for protection against roentgen rays and the electrical current. Under the heading of roentgen examination of the bones and joints, the following subjects are discussed: general fundamentals, osteoporosis, Sudeck's bone atrophy, osteosclerosis, periostitis, bone atrophy, bone fractures and healing, inflammatory bone diseases, heterotopic cartilage and bone formations of constitutional origin, bone tumors, intensive systemic diseases of the bones and their sequelae, injuries and diseases of the joints, osseous aseptic epiphyseal necrosis and disturbances of the apophysis (Perthes', Köhler's, Kienböck's, Schlatter's,

disease), deformities, disturbances during growth and maturity, roentgen diagnosis of the skull, myelography, soft parts and localization of foreign bodies.

Under the heading of "Roentgen Examination of the Thoracic Cavity" the section headings are normal thorax and pathological thorax. Under the latter are discussed changes in position and form of the trachea due to intra- and extratracheal processes, tracheal and bronchial foreign bodies, bronchial diseases, pulmonary diseases, pleural diseases, roentgen findings after operation on the lung and thoracic wall, diseases of the diaphragm, diseases of the heart and the large vessels, diseases of the mediastinum.

Under the heading "Roentgen Examination of the Digestive Canal" the following are discussed mouth and thoracic cavities, esophagus, stomach and duodenum. Under the last we find a discussion of the roentgen picture of a normal stomach, of the normal duodenum, the appearances of ulcers in the stomach and duodenum, carcinoma of the stomach and other gastric tumors, foreign bodies in the stomach and duodenum, stomach changes through extraventricular processes, constitutional and functional changes in the stomach shape, unusual diseases of the stomach and duodenum. The remainder of the chapter contains discussion of the small and large intestine, peculiarities of the juvenile gastrointestinal tract, pneumoperitoneum, diseases of the liver, spleen and pancreas and diseases of the biliary system.

The final chapter discusses the "Roentgen Examination of the Urinary Organs" under the following headings: technique, normal kidney picture, function of the efferent urinary canals, congenital anomalies, acquired diseases of the urinary system. ureter, bladder and urethra.

B. Cohen.

The outstanding work among medical publications so far this year is Special Cytology, The Form and Functions of the Cell in Health and Disease, a textbook for students of biology and medicine, written by thirty-five contributors of recognized scientific ability and edited by Edmund V. Cowdry of the Rockefeller Institute of Medical Research. It is published by Paul B. Hoeber, Inc., New York, 1928, in 2 volumes, 1348 pages, 693 illustrations.

The editor states in the Preface: "One principle has been held in mind in organizing this book, namely, that each division should be entrusted to an investigator who through his own researches has personal knowledge of the subject on which he writes . . . It has been found that our contributors are often engaged in branches of biology and medicine which, at first sight, seem to be far removed from what is ordinarily regarded as "cytology." This clearly illustrates the central position of modern cytology in the biological and medical sciences.

In order better to understand physiological processes or more intelligently to treat disease, which amounts to much the same thing, these investigators have, one and all, resorted to a study of the fundamental living units, that is to say, of the cells of the tissues with which they are concerned. They have done this in different ways, directly and sometimes indirectly, and the results make for progress. Some of them are mildly surprised to find that they are classified as cytologists and to realize that they have gone further than the professional cytologists of the old school.

The Table of Contents includes

I. Introduction
II. The Skin and Its Derivatives
III. The Mucous Membrane of the Nasal Cavity and the Paranasal Sinuses
IV. The Epithelium of the Lower Respiratory Tract
V. The Salivary Glands
VI. The Gastric Glands
VII. The Intestinal Epithelium
VIII. The Cytology of the Liver and Its Functional Significance
IX. Cytology of the Pancreas
X. The Erythyrocyte
XI. The Lymphocytes and Plasma Cells
XII. The Myeloblast
XIII. The Granular Leucocytes
XIV. The Macrophages or Histiocytes
XV. The Structure of the Hypophysis Cerebri of Man and of the Common Laboratory Mammals
XVI. The Pineal Gland
XVII. The Thyroid, Parathyroids and Thymus
XVIII. The Suprarenal Bodies
XIX. Renal Tubules
XX. Cartilage and Bone
XXI. The Synovial Membrane of Joints and Bursae

XXII. Striated and Smooth Muscle
XXIII. Cardiac Muscle
XXIV. The Specialized Systems of the Heart
XXV. Visual Cells and Retinal Pigment
XXVI. Cytology of the Internal Ear
XXVII. The Internal Architecture of Nerve Cells
XXVIII. The General Relation of Histological Character to Function in Mammalian Neurons
XXIX. The Sympathetic Nerve Cells
XXX. Neuroglia and Microglia. The Interstitial Tissue of the Central Nervous Systems
XXXI. The Cytology of the Cerebrospinal Pathway
XXXII. Cytology of the Ovum, Ovary and Fallopian Tube
XXXIII. Cellular Changes in the Fluid of the Mammalian Vagina
XXXIV. The Cytology of the Mammary Gland
XXXV. Interstitial Cells of the Testis
XXXVI. The Male Germ Cells
XXXVII. The Seminal Vesicles, Prostrate and Bulbo-uretheral Glands

Anyone pretending to truly practice medicine, one of the fundamentals of which is a knowledge of the forms and functions of the cell, which in turn leads to an appreciation of pathological conditions, will find Special Cytology fascinating, instructive and indispensable. If there was one book we would recommend to a medical student to own and read and reread and study, it would be these volumes.

Typographically the book is all that a lover of fine things can expect.

We pick up a small volume of 129 pages entitled Appendicitis by Thew Wright, A.B., M.D., F.A.C.S., published by Allen Ross & Company, New York.

This book is written for the lay reader and for that reason technical terms have been avoided or when introduced have been fully explained by the author.

There are excellent chapters on Anatomy, The Functions of the Appendix, The Diseases of the Appendix, The Symptoms of Appendicitis and the Treatment. There is a chapter devoted to Appendicitis in Children and the last chapter deals with the Means of Prevention.

The physician would be interested in this book only to recommend it to a patient who would want to know more about the subject.

The Oxford Medical Publications bring out Post-mortem Appearances by Joan M. Ross, M.D., B.S. (Lond.), M.R.C.S., L.R.C.P. Ed. 2. Pp. 225.

This book is designed to fill a gap, which has long been obvious, in textbooks of pathology. Written in a concise form, it describes the chief anatomical changes found in the commoner diseases. The general practitioner who may be called upon to make an occasional autopsy will find it a useful guide as to what he should look for. The student will find it invaluable as an introduction to gross pathology.

A worth while book is The Abdominal Surgery of Children by L. E. Barrington-Ward, CH.M., F.R.C.S. (Edin.), F.R.C.S. (Eng.), published by the Oxford University Press. Pp. 283, 3 colored plates, 82 illus.

It is well written. All extraneous matter has been omitted and at the end of each chapter is a compjete bibliography of the subject discussed.

The Oxford University Press has also brought out The Surgical Treatment of Malignant Disease by Sir Holburt J. Waring, M.S., M.B., B.SC. (Lond.), F.R.C.S. This is a pretentious work of 677 pages, illustrated with 19 colored plates and 277 figures.

The author has introduced into many of the chapters of the book semidiagrammatic illustrations of the lymph vessels and lymph glands in connection with the organ or anatomical area which is dealt with. This is of considerable value from a clinical and operative point of view. The details of operations given in some of the chapters have been abstracted in the main from "Manual of Operative Surgery." The subject of Malignancy is thoroughly covered. The references and bibliography are most complete and should appeal to the student and research worker. This book is most earnestly recommended to every surgeon and every physician.